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INSECT INTRUDERS IN INDIAN HOMES



STEBBING

Entomology





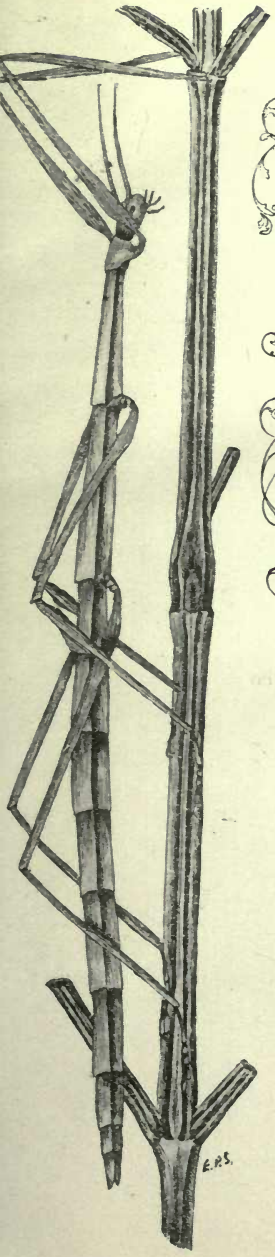
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Entomology

With the Author's best wishes
Sept 1909

INSECT INTRUDERS
IN
INDIAN HOMES



Insect Intruders in Indian Homes

BY

E. P. STEBBING

C Insects

Entomology

CALCUTTA

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SB903
S8
Entomology

TO
MY WIFE.

M371763

AUTHORITIES CONSULTED.

In the preparation of this small book I have to acknowledge my indebtedness to the works of the following Authorities :—The Volumes of the *Fauna of British India* (Bingham's *Hymenoptera* and *Butterflies* and Distant's *Rhynchota*) ; The *Indian Museum Notes* and *Journal of the Bombay Natural History Society ;* H. M. Lefroy's *Insect Pests ;* Sharp's Volumes on Insects in the *Cambridge Natural History Series ;* Packard's *Guide to the Study of Insects* and *Entomology for Beginners* and Ritz Boz's *Agricultural Zoology.*

For some of the figures made use of in the text my acknowledgments are also due.

The figures on pp. 3—5, 6, 8, 9, 18, 22—24, 49, 90, 112, 113, 147 first appeared in my papers on *Insect Life* in the *Journal of the Bombay Natural History Society.* The mosquito figures on p. 2 are from the photographs by Col. Giles, I.M.S., which appeared in F. V. Theobald's *Monograph on the Culicidæ.* The figures at top of page 6, on pp. 38, 135, are from the *Fauna of British India.* Those on pp. 16, 29, 30, 32, 100 are after *Indian Museum Notes.* Those on pp. 56, 123 from Lefroy's *Insect Pests.* On pp. 79, 80, 118 from Sharp's Insects in *Cambridge Natural History.* At bottom of p. 70 and on p. 115 from Packard's *Guide to the Study of Insects.* And on pp. 98 and 99 from J. R. Boz's *Agricultural Zoology.*

"To the solid ground
Of Nature trusts the Mind that builds for aye."

WORDSWORTH.

THE designs for the cover, title page, etc., as also many of the drawings are from the pens of the Author and his Wife.

Acknowledgments are due to Mr. S. Eardley Wilmot, C.I.E., for suggesting the title of the book together with a rough draft of a part of the title page.

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FOREWORD.

My Publishers have asked me to write what they designate by the grandiose term 'Foreword' to this modest and altogether popular illustrated account of a few of the commoner Insect Intruders one meets in the Home, in the Garden or out in Camp in this Land of Exile.

I confess to a feeling of considerable diffidence in carrying out my Publishers' request and yet dare not altogether ignore the task laid upon me.

I would, therefore, say to my readers *in esse* that for those who have at times wondered what the queer creatures are who, without our leave, invade our homes at all seasons but more especially in the rains and where they come from, I have written a brief account of a few of the commoner of these unwelcome visitors.

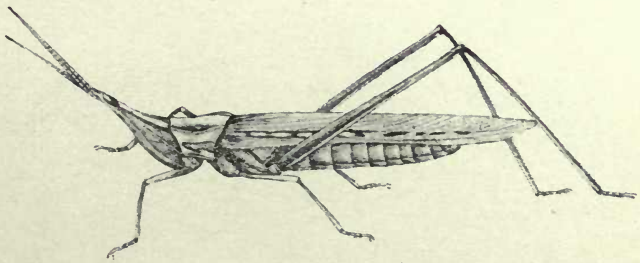
For those again who love their gardens and have so often to bewail the fate of loved and lost plant darlings, I have, during potterings round the Girl's garden, jotted down a few notes on the pests she anathematises so freely and against which she endeavours to carry on an active campaign.

Lastly, for the jungle lover, I, who am of the Jungles, have culled, from a fairly extensive aquaintance with the Jungle Insect Folk, some of the commoner forms, and have inscribed a few notes which may prove of interest to him who looks upon his trips to India's Jungles as among the greatest amenities of his Life in the East.

E. P. S.

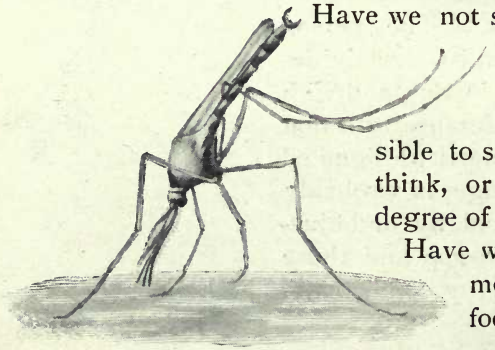
INTRODUCTION.

ALL who have travelled east of Suez have been brought into sharp, one may say into unpleasant, contact with one great class of Animal Life—the World of Insects. The person possessed of no naturalist proclivities may pass his or her life in England with but the slenderest acquaintanee with that great mass of life popularly designated 'bugs.' Their knowledge is probably limited to the household fly and blue-bottle, the sugar loving wasp and those 'nasty' spiders, which by the way are not insects.



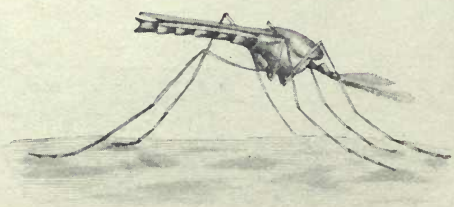
Not so in the East and more especially in the moist tropical portions of the East. Here Insect Life may be said, in a Yankee form of speech, to boss the situation and to reign supreme: and most unpleasant can these Intruders into our Indian homes make themselves. It may be difficult for the stay-at-home to picture what the Biblical Insect Plagues meant to the Egyptian, and he may well be forgiven if he good-naturedly characterises them, with other Eastern imagery, as a *façon de parler*.

East of Suez we know differently!



Have we not seen that common insignificant House Fly in such numbers that it has been impossible to sit or stand, eat or sleep, think, or even swear, with any degree of comfort?

Have we not ever with us that most insidious of all insect foes the malaria-giving



Mosquito (the figures show the mosquito *Anopheles* in positions of rest, much enlarged) who, light as any sylph on the wing, approaches with that delicate swing and pinging buzz which chases away sleep and sets every muscle and sense on the alert?

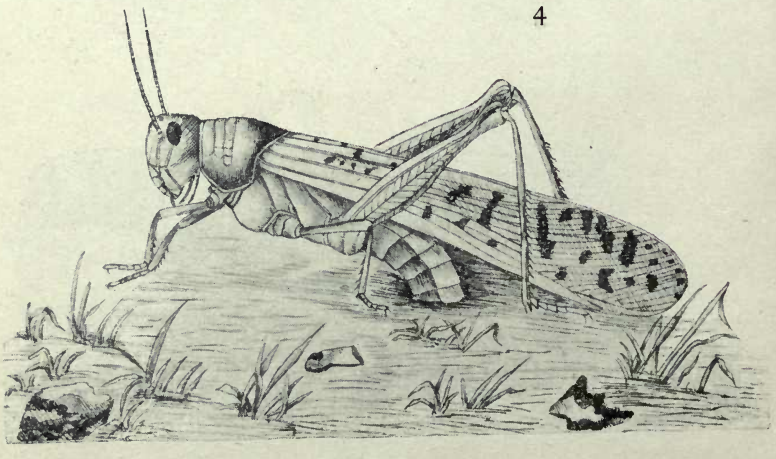
Have we not seen those marvellous and inexplicable invasions of the great Migratory Locust, the locust of the Egyptian Plagues, gradually spreading themselves through the length and breadth of the Continent, from their homes in the sandy desert fastnesses of Rajputana, Sind and Baluchistan? Are not the periodical eruptions of this pest still a source of mystery and a subject of disagreement amongst scientists who have endeavoured to study the habits of this insect and have wished to give chapter and verse to account for its migrations from its desert homes? Have we not, some of us, seen or read in our newspapers of heavy mail trains brought to a standstill owing to great



flights of this locust choosing the permanent way as a convenient resting place: the numbers of the killed and dying insects, crushed during the passage of the train, rendering the rails so slippery as to no longer afford a hold for the wheels? Do not whole communities turn out and fight shoulder to shoulder to keep the invasion from their fields and have not all attempts proved so often useless. Unchecked and uncontrolled, because so often in the past so completely misunderstood, the invading hosts have passed on, after clearing every green thing from the face of the country, leaving in their wake famine as dire as a succession of droughts. Or, worse still, the females before disappearing have deposited in small holes in soft sandy spots elongate masses of eggs stuck together with some siccable substance and having the appearance shown in the picture here.



Areas in which these egg masses have been deposited look for all the world as



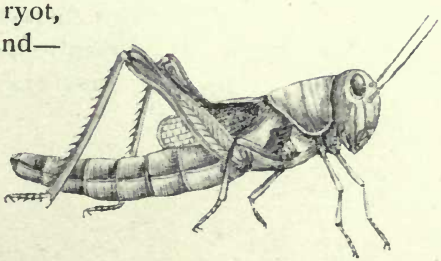
if a heavy shower had recently passed over them, the soil being pitted with small holes as if made by heavy rain drops. From these eggs eventually emerge little black wingless hoppers, at first small and helpless and quite unlike one's notion of a grasshopper or locust (insects which have a close family affinity the one to the other), but rapidly developing by a series of moults or casting of the skin into the insects here depicted. Some few days after hatching, the little 'hoppers' pack together and move down into the cultivated lands in well-ordered battalions and brigades and divisions, in which formation they spend the rest of the wingless portion of their lives devouring the crops: whilst that gentlest, most incomprehensible and fatalistic of men, the Indian ryot, looks on with folded hands and—does nothing.









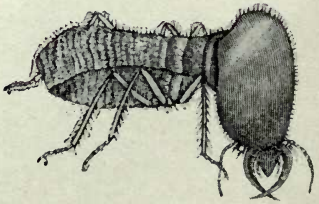




Does not the cold weather bring with it plagues of Green Fly and Green Bug, of well-known Calcutta fame, which fill our soup and drinks and turn the members of a solemn dinner party or a quiet orderly club into active and eager but, alas, profane collecting entomologists! And worst of all, do we not all know that vilest and most nauseous of all insects—yclept the 'stinking bug,' so termed for obvious reasons, which once tasted involuntarily is, it will be admitted, never to be forgotten?



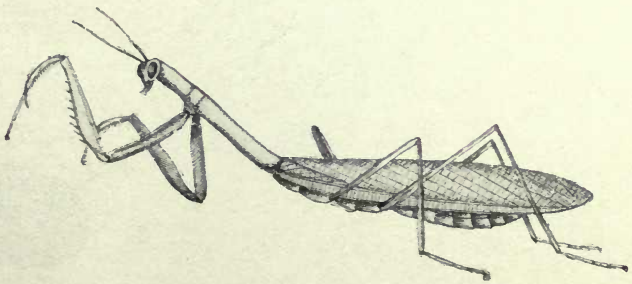
Again, have we not ever with us that unmitigated curse, that cunning thief in the night, the White Ant or Termite, a worker and soldier of which are shown here much enlarged? Can any one of us boast of having ever got even with this stealthy and untiring foe? All is grist to his mill as we find to our cost when some treasured oak cupboard or valued wardrobe, luxurious Turkey carpet or expensive leather trunk is discovered to be



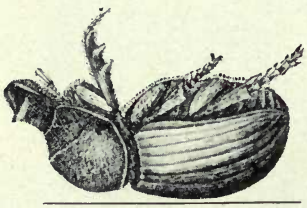
but an outer and worthless shell of what it had once been.

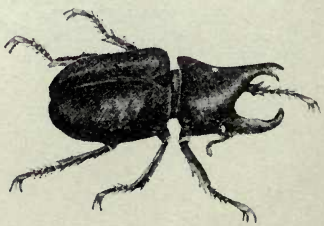
But it is not only the abundance of a few of the commoner forms of insect life which strikes terror and disgust into the bosom of the Eastern exile, but the astonishing numbers of minute forms which swarm around us and dispute our right to a place in a territory so peculiarly their own. Take, *e.g.*, our lamps after sunset. Visit the brilliant arc light of some tall street lamp or of a night running river steamer: it will be seen to have attracted myriads and myriads of large and minute forms of insect life. On Bengal, Assam and Burma river steamers the lascars will come round and brush up pail upon pail load of self-immolated creatures.

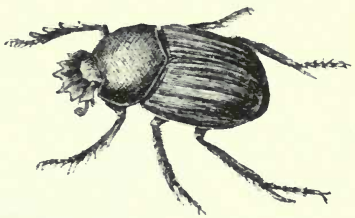
Or, again, the white napery of our dinner table in the rains—and at other seasons also—will show a crawling or fluttering mass of forms amongst which stalks solemnly or stands stationary that



curious insect, surely some pre-historic remnant of a past giant race of insects—the Mantis or Praying Insect. A fierce predatory beast this who will take dinner with you with the greatest assurance and without a by-your-leave ; for your softly draped lights ensure for him many a delicacy and fat toothsome morsel. But one thing is likely to upset his careless and dignified equanimity and that the blundering stupidity and awkwardness of those ever unwelcome guests, the great heavy black Scavenger Beetle or thick set Cockchafer, whose booming ill-directed flight appears ever to propel them with a wearying and unvarying directness against the nearest object which will ensure their downfall with that well-known dull thud. Their appearance on the scene is the sure precursor of a prompt and hurried exit on the part of the fairer sex and an unrehearsed

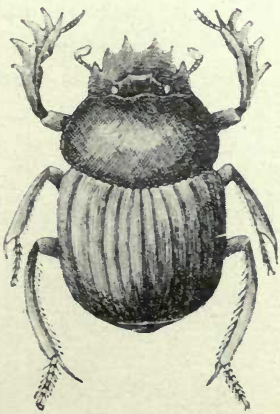


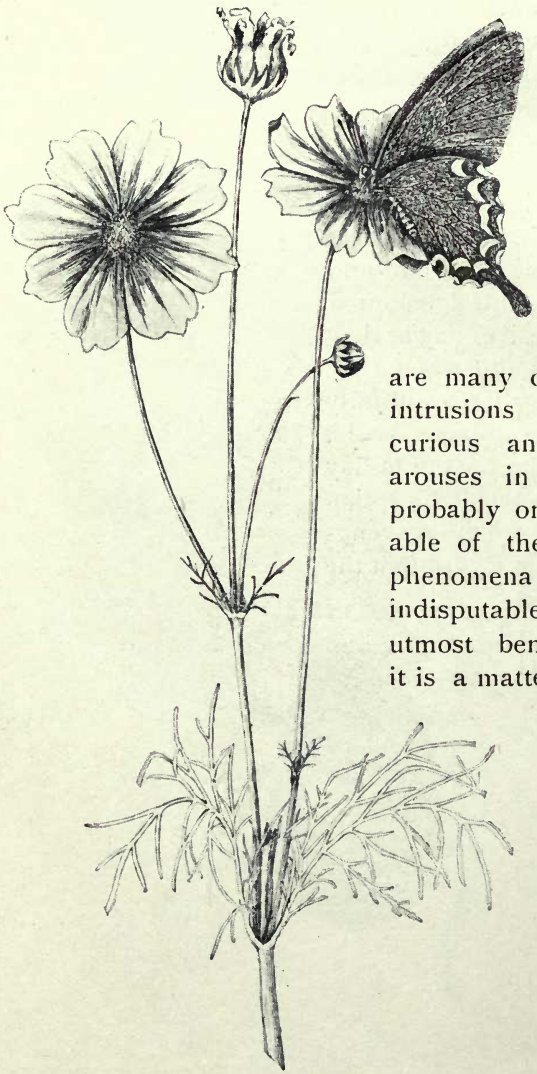




shikar episode upon that of the male members of the community, aided by the imperturbable native servant who thinks this but another idiosyncrasy of the never-to-be-understood sahib log.

And yet a curious interest attaches to these scavenger beetles, for is not one of them the Scarabæus, the famous Scarab of Egyptian mythology? Visit the tombs of the ancient Egyptians at Sakkârah and Thebes and elsewhere and examine the wonderful mural coloured paintings which are as fresh to-day as they were 4,000—5,000 years ago when they were executed. Here you will see faithfully portrayed the common Scarabæus beetle, an insect as plentiful in the East of to-day as it must have been in ancient Egyptian times. Of such utility were the scavenging habits of this insect in Egypt that the wise men of yore ensured its protection by attaching to it the sanctity of a saint!





And the fair ones of those great ancient races did not disdain to wear the image and sign of the Scarab, even though it had the likeness of a 'nasty horrid insect.'

What will not custom and habit do for us all! We may yet wear 'black beetle' lockets!!

Sadly unlooked for, are the vagaries of our insect friends and most unpremeditated are many of the episodes their intrusions give rise to. The curious antipathy their presence arouses in the human breast is probably one of the most inexplicable of the many unexplainable phenomena in nature, for it is indisputable that many are of the utmost benefit to man. Indeed, it is a matter of common scientific

knowledge that the superior race would be hard put to it to find sustenance on this planet of ours were some of our insect friends to disappear off the face of it to-morrow. Huxley long ago showed that those tiny insects the Green Blights, which infest our rose trees and chrysanthemums (and many other plants in the world) would, if left unchecked by predaceous and parasitic insects, soon eat mankind off the face of this earth which he is so often apt to consider made expressly for his own delectation.

And it must be remembered that all insects are not abhorrent to man. Beauty in the insect world, it will be admitted by all, exists. The wonderfully brilliant Butterfly softly floating in the golden sunlight on shining gorgeously-coloured diaphanous wing has been sung of poets, painted of artists, and admired by the mere



layman from time immemorial. He has also been collected, described and named by generations on generations of babes, boys, youths and men ; and we may include many of the gentler sex, to whom the seductiveness of the attractive beauty has proved sufficient to overcome the natural instinctive dread for the 'nasty insect.'

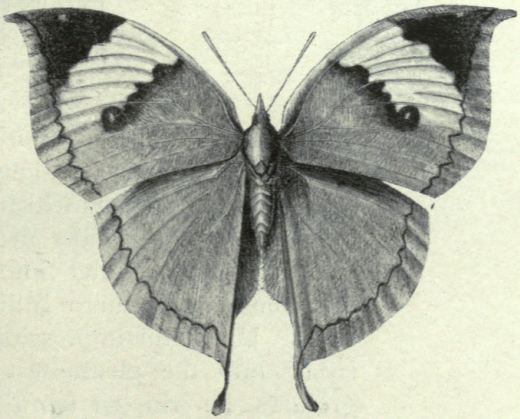
But that beauty it is not for pen of ours to describe.

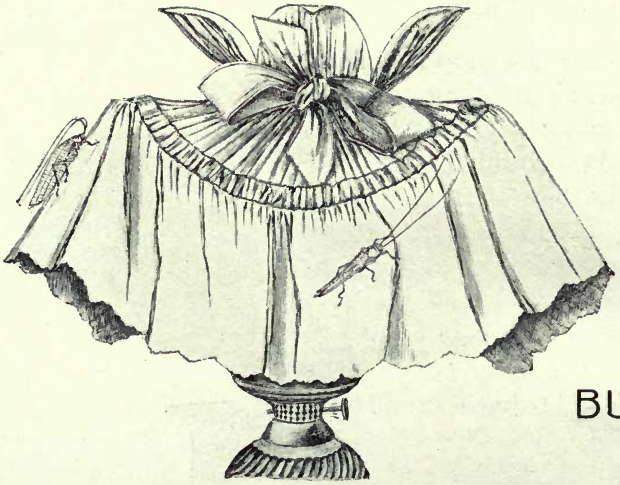
No ! With a sigh we step aside from the popular and attractive paths of our predecessors to turn into that rocky uphill one which treats of those forms of life which one so often hears alluded to as—

'Get out you little beast.' 'Nasty horrid thing.' 'He's there, dear, I know he'll run up my leg !!'

No ! In these few sketches of some of the commoner forms of Insect Life one finds intruding into our Indian homes in this Land of Exile we do not propose

to deal with the Butterflies, but to confine ourselves to the less well sung though often met with members of that great World which forms so intimate a portion of our life in the East.





IN THE BUNGALOW.

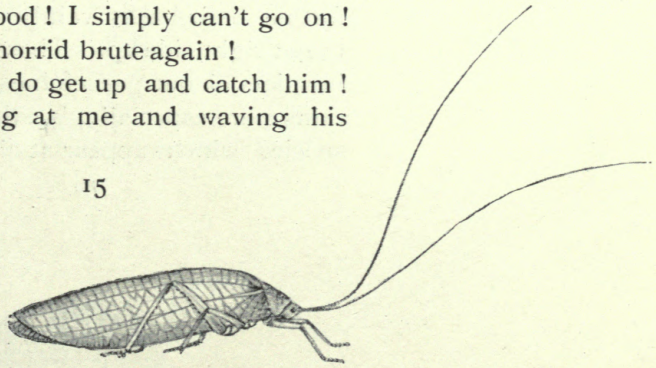
WE all know the beautiful apple green Grasshopper with long thin whip-like feelers and wings which have veins in them like the veins of a leaf. He is a common intruder into our lamp-lit rooms in Northern India during the rains. Under the impression that he has fallen into the pleasantest of feeding grounds, he will sit upon the delicate sap green or rose pink lamp shade and

meditate solemnly on the illusory nature of life which changes the most alluring of food into tasteless fabric, or at times brings the sun into most unpleasantly close quarters. Or anon he will burst into song, his repertoire consisting of a series of most discordant metallic notes.

Curiously abhorrent to the gentler sex are the clumsy dashes at flight made by these harmless creatures. How oft has a favourite piece of Mendelssohn which, combined with the after effects of an excellent dinner and fragrant cigar, was unknowingly drifting one into the land of nod, suddenly ended in a crash of discord bringing one to one's alertest mood, whilst the Girl's disgusted, not to say slightly tearful, voice is heard exclaiming—

"It's no good! I simply can't go on! There's that horrid brute again!

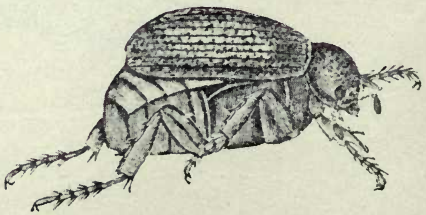
"Oh, dear, do get up and catch him! He is looking at me and waving his whiskers!"



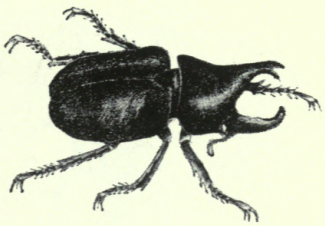


"*There!* Now he is on the floor and I *know* he is going to crawl up" (the owner of the voice being by now safely perched on the music stool with skirts close gathered round her, after the fashion dear to our Aryan Brother).

There *is* no help for it! One has to get up, carefully capture the intruder by the wings on his back (no other parts will do, as they all come off) and carry him outside. Whilst up one makes up one's mind to do the thing thoroughly and a peregrination of the room brings to light many other intruders: Scavenger and Cockchafer beetles slowly crawling up the walls, humming blunderingly in corners, or in various positions of discomfort on their backs vainly endeavouring to get right side up. These are common invaders of our peacefulness, during the rains more especially, but there are many species which appear at all seasons and



always uninvited and unwanted. Swift enough on the wing in the dark, are these scavenger brutes, for probably the larger proportion of them are night fliers, but once they get into a lighted room, and lamps have a most pernicious fascination for them, they appear to immediately lose their heads, and peace is only bought by their capture and ejection. The most superficial inspection will show that this tribe of beetles are coated in exceedingly thick plated armour and many of them have large horns sticking out of their heads and other weird protuberances, the use of which is very imperfectly known. It is generally the males which are armed in this manner, and they doubtless use this novel form of armature in their fights for the possession of the unarmed softer sex : if females encoated in bullet proof plate armour can be included in such a category ! Perhaps, however, even the hug of a mail-encased, spiney, horny-headed scavenger beetle

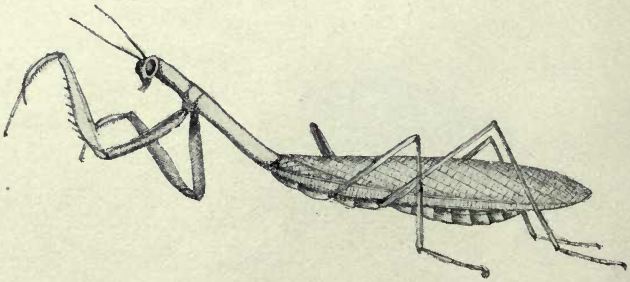


may be of some slight interest to his sadly coloured hornless *inamorata!* Who can say?

Our tour of inspection will not end with the ejection of the grasshopper and scavenger beetles. Moths in various stages of dilapidation or disintegration, according to the proximity they have succeeded in attaining to the top or sides of the lamp chimneys, will come to light, with many other self-immolated creatures. A noisy Cricket may be found chirruping in a corner. He is essentially an insect of the garden and field, and we shall have some remarks to make upon his exploits in our garden chapter.

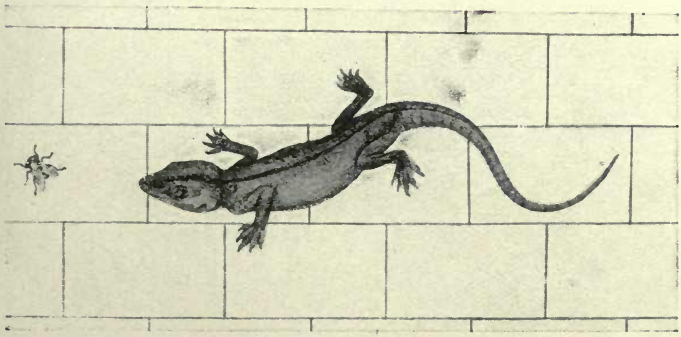


Another intruder of queer appearance often visits our homes of an evening and he comes with a definite purpose in view. Everyone knows those most curious of all forms of insect life the so-called Praying Insect or Mantis. Almost ironical is the name of Praying Insect attached to the Mantis. True, he earns it from his curious



method of posture, the front legs being held up in an attitude of prayer. But it is a queer irony which has developed such a position, for it is maintained with the sole idea of capturing his food which consists of living insects. Like unto other apparently solemn and sober-minded citizens, the attitude assumed is one of prayer, but the thoughts are occupied very differently, as we shall see when we come to consider him more fully in a later chapter.

Whilst on the subject of the insect intruders in the home I cannot refrain from mentioning here the 'Lizard on the wall,' for, though not an insect, he is part and parcel of the so-called furniture one becomes the proud, though fortunately temporary, possessor of when renting an Indian bungalow. Everyone knows this little creature and I hope everyone treats him in the proper spirit as a friend, for such he assuredly is.



I admit that to the new comer to India the sight of a large fat-sided, yellow lizard flattened against the wall close to the wall lamps, with his great convex black eyes sticking out of his head and apparently fixing one with their glassy stare, is a little alarming. But watch him for a short space and you will see the eyes fixed intently on some small fly crawling towards the light. Moving in short quick rushes at first, the lizard finally approaches very very slowly in scarcely perceivable movements until within dashing distance, when a quick movement, a gulp, and that insect has left this outer world for the interior regions of the reptile. Watch a little longer and, if it is the rainy season when insects are most plentiful, you will soon see the sides of that lizard visibly distended like those of a puppy just after its meal. Where they put all the insects they catch and swallow of an evening round a lamp has ever been a mystery to

me. They seem to remain on the *qui vive* for hours, feeding all the time : and yet they don't burst—at least I have never seen that unpleasant fatality happen ! Uncomfortable as their presence may be and unlovely as their appearance undoubtedly is, never drive away or kill the domestic lizard of our bungalows, for he is striving his utmost to lessen the numbers of our insect intruders ; and more power to him, say I, for I have often seen him swallow as a *hors d'œuvre* some particularly noxious form of pest when he has been dining with me uninvited on a neighbouring wall.

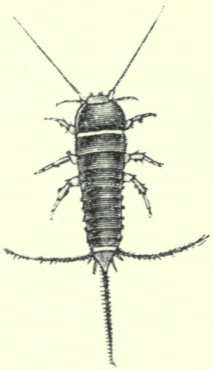
Our domestic lizard is very human too ! We were out in a small rest-house the other day in camp. The only bed room was the tiniest of apartments with a low sloping tin roof with one of the ordinary ceiling cloths stretched beneath it and sagging down in the usual manner. Two lizards, a most devoted couple, ranged over one wall, having their home

in a corner of the ceiling cloth which was reached by an entrance where the sagging left an aperture between it and the wall. The evening, after the lamp was lit, was the great time for this couple. They then quartered that wall after the manner of a couple of setters, and many an unwary insect in endeavouring to escape the frying pan fell into the fire. At times, however, after our couple had retired of a night, the domestic bliss would be broken and then sounds of scuffling and excited twittering would come down through the ceiling cloth! For the world and its inhabitants are the same the globe over, and even the cold-blooded unlovely lizard finds that bickerings and curtain lectures occasionally disturb the serenity of his night's rest!



Every housewife has an intimate acquaintance with, and will have often anathematised the so-called Fish Insect. An elongate, wingless, narrow, silvery little beggar this, with his body of 12 simple

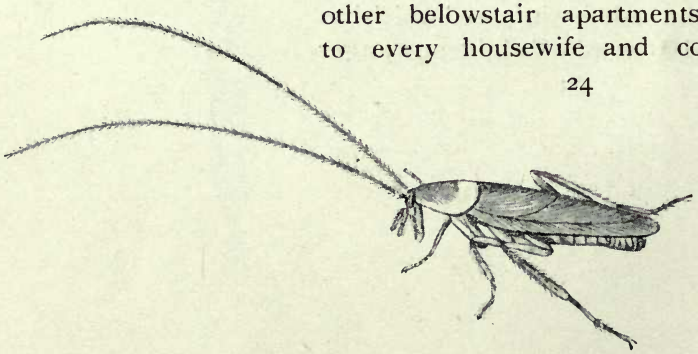
segments ending in three long tails, portions of which he apparently willingly and readily parts with during one's often vain efforts to slay him. A curious little relic this of a bygone age, for he is supposed to be the nearest living representative of an Ancestor of all insect life and comes nearest to the scorpions and spiders at the bottom of the insect scale.



Many and curious are the legends and stories pertaining to this queer specimen of creeping life. Although so numerous and common in the country, it may be said that even the food he eats is still a debated question. He has been duly credited with all sorts of base designs on the Paris creations of the fair sex, and many a bearer and ayah has palmed off sheer laziness and neglect on to this innocent little beggar. When clothes and cloth materials long put away and forgotten have been unpacked full of holes, it is the bad 'feesh-insect' which has often served to ward off righteous anger

and well-merited punishment. Serious as are its crimes, however, these are not amongst them. The insect is really partial to saccharine matters, and it is to get at the gummy materials and glaze used in the binding of books and the framing of pictures that the fish insect commits the great damage he is capable of doing. Its mouth parts are not adapted to enable it to touch shiny paper, but it will riddle tissue paper and such soft materials as muslin and tulle. The insect's home is in dusty corners of rooms or on the top of dusty rafters, etc. Cleanliness in the bungalow, therefore, means reducing the danger from fish insects to a minimum.

Another common house insect is the world famed and much feared (by our lady friends at any rate) Cockroach, a member of which family is our common so-called 'black beetle' of the English kitchen and other belowstair apartments. Known to every housewife and cook is the

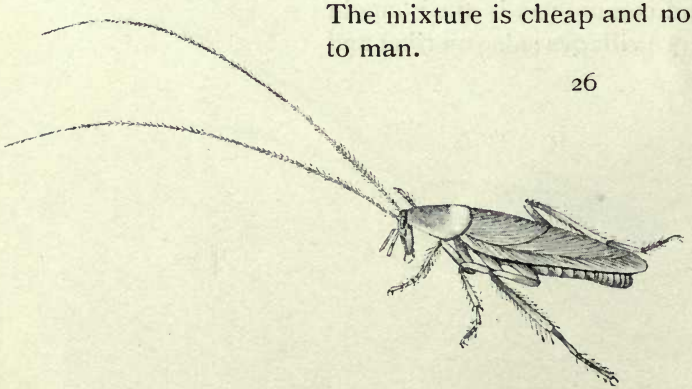


cockroach. The insect is more sinned against than sinning, as has been and is the case with so many other forms of animal life, for it really acts to some extent the part of a scavenger and a scavenger of no mean importance in India.

The horror and loathing which attaches to cockroaches or 'black beetles,' to keep to popular parlance, is probably due to the rapid movements and skulking habits of these insects. They are particularly nocturnal in their habits, the appearance of even the modest hand lantern sending them skurrying back to their holes in rapid flight. The common cockroach of this country is a brown insect of lighter build and more active habits than his English confrère. His home of origin from which he takes his specific name is America, but it is probably a century or so since he spread throughout the world. He is a domesticated insect and will be found commonest in the home in towns and large villages; also on river and

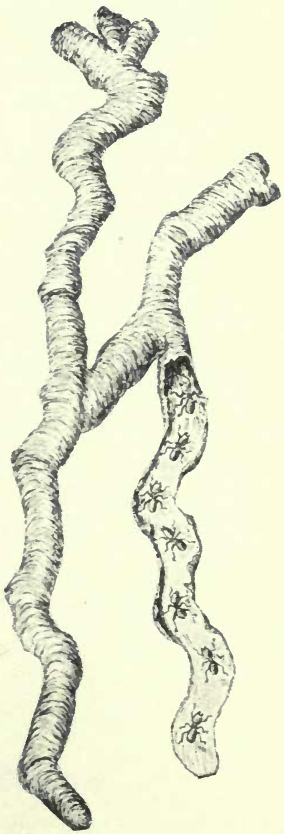
ocean-going steamers, where one often has the questionable pleasure of his company in one's cabin what time he disports himself on your blanket coverings at night.

Probably the most interesting information to the housewife on the subject of these insects will be the knowledge of how to free her house from them. Most of us would rather keep our houses clean without the help of this intruder. Well then, take some borax, powder it finely and mix it with the same amount of powdered chocolate, taking care that the mixing is done thoroughly, so that each particle of chocolate takes up some of the particles of borax. Sprinkle this in the corners of the room and along the edges of the wall and behind articles of furniture. Here it will be picked up and eaten by the insects, for cockroaches are very fond of chocolate, but borax is poisonous to them and will kill them off. The mixture is cheap and non-poisonous to man.

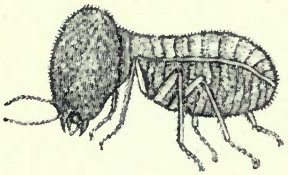


Other unpleasant and common intruders on our household peace are the so-called White Ants or Termites and the various forms of true Ants.

The well-known white ant has been already alluded to and perhaps merits further mention here, as every householder in the country is aware of the capabilities for destruction evinced by this pest of pests. Its insidious attacks are the more to be feared since they are always carried on under cover. A past master he in the art of successful shielded attack, for he moves nowhere exposed to the light of day, but invariably shelters himself beneath a covered way of mud, and under this protection, which is most skilfully utilized, he is enabled to reduce the stoutest beam to rottenness and powder without one's being even aware that it has been attacked.

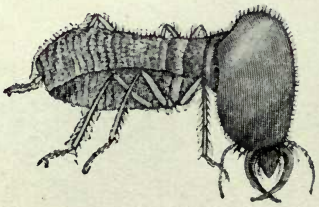


Whilst in Calcutta a year or two ago I was shown the back of some valuable old oak panelling which had been attacked

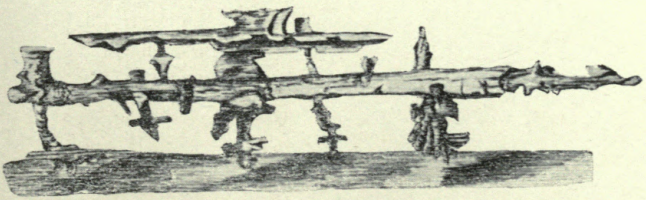


by these pernicious pests. It was a wonderful sight. The front which consisted of most beautiful carving was now a mere match-board shell which crumbled to pieces on being touched at all hard. The whole of the wood at the back had been destroyed by the termites, and this in the space of a few months. This is but a sample of what one may expect from these pests, and it is difficult to say what sort of wall short of a solid steel one will resist their stealthy attacks for any length of time. At any rate, the problem seems to have defied solution by the entire staff of the Great Indian Public Works Department.

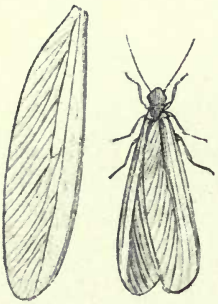
The life history of the white ant is pretty well known. The insects build those large earthen mounds found out in the compound or in neighbouring waste areas, or construct nests in the mud walls of our bungalows, ruining a large portion of the interior of the walls in doing so. It is not from these nests and tunnels in



the walls of our *katcha pakka* bungalows themselves, however, that we, the occupiers of these usually most undesirable residences, suffer. From these lurking places the worker white ants issue in hordes and carry their earthen galleries either in shallow narrow tunnels or in broad earthen masses up the wall or up the pillars or wooden posts and beams or over the floors of our houses. These earth sub-ways are being run up to some sound beam in our roof top, and once they have reached this, the horde spreads itself over the surface under a protective layer of mud and works its way into the wood until gradually the whole of the wood structure is removed, the outer shell being left in such a condition that a casual inspection will give one no suspicion of the state of affairs inside. In eating out the heart of a beam in this manner the termites leave strands and knots of wood *in situ* in a most clever manner, as shown here, these



serving as supports to the galleries above, much as we use mine props. Failing these connecting links the galleries below would cave in and heavy loss of ant life would result. This is one of the stealthy forms of attack which the resident of the bungalow has to fear, for it may lead to his roof coming in on top of him.

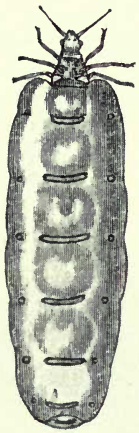


In addition to the worker white ant, which is the member of the community from which we actually suffer, the nests contain the soldier, the king and queen, and the grubs. These latter, according to the way in which they are fed, become workers or soldiers, or the winged males and females which issue at intervals from the nest in those large swarms which give delight and at the same time a heavy meal to all the insectivorous birds and small insect-eating mammals of the neighbourhood.

All will have seen these large flights of winged termites issuing from the nest or from some hole in the plinth or lintel of

a door of the bungalow. This is a pre-nuptial flight and after returning to earth the termites may be seen pulling or biting off their wings for which they have now no further use. These wings are of a delicate gauzy consistency being much longer than the insect itself and having the appearance of a small bird's feather as shown in the sketch here. Just above the junction of the wing with the body there is a small transverse thickening or suture in the wing, and it is along this line that the wing breaks off on the return of the termite to earth. When the wing has been pulled or broken off, a small triangular flap is thus seen left attached to the body. After losing their wings, those ants which are found by worker termites are taken back to the nest, but this number is very small, by far the larger number perishing. The female on return to the nest commences egg-laying and lays a very large number of eggs, her body swelling up until she reaches two





to three inches in length with a great girth.

It has been said that the larvæ are turned into workers or soldiers or male and female winged individuals according to the nature of the food given them. Thus, should anything happen to the king and queen termite, by modifying the food given to a couple of grubs in the nest, a substitute royal family can be produced at short notice. It is owing to this little known fact that it is impossible to get rid of a white ant's nest in the compound by merely digging into it until the king and queen are found and killing these.

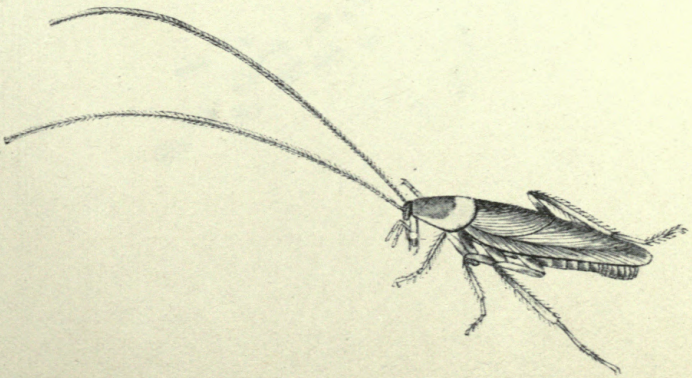
As to preventing the attacks of this pest, there is little to be said. Tar applied thickly to post, beam and rafter will stop them as long as it is kept fresh. It is also a good thing to tar the edges of the floor where they meet the wall, and the wall itself, for three or four feet inward and upward. It will protect carpets and almirahs as far as anything will.

Some years ago, whilst still a careless unhappy bachelor I had the great privilege of being taken into a lady's godown. It was impressed upon me that as I was apparently endowed above the average man with some notions of domesticality and of what domestic bliss might be, this crowning favour was shown to me. I hastened to appear suitably conscious of the great honour !

The serried rows of tins, bottles and bags which apparently filled the overstocked shelves to repletion, backed by stacks of soap, brushes, dusters, *et hoc genus omne* of the order miscellane, did not arouse great enthusiasm in my mind, though I remember vaguely wondering where it all went to ! I have since learnt ! !

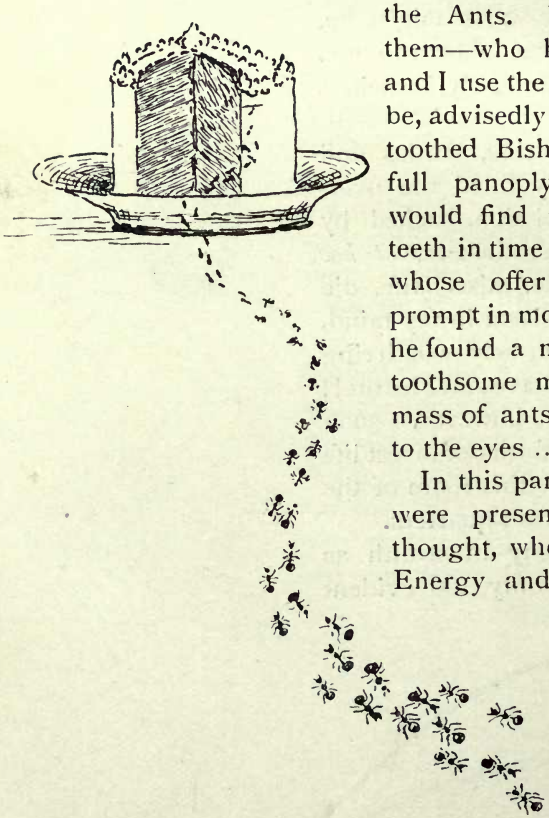
My curiosity was, however, soon aroused by the various forms of insect life which apparently made this room of the house peculiarly their head-quarters.

Cockroaches stole away in stealth as if apologizing for their only too evident



intrusion. My friend did not, or would not, appear to note their presence and hurried exit or rather entrance into favourite *caches !*

The most noticeable of our intruding friends here were, however, the Ants. Who does not know them—who has not cursed them, and I use the word, strong though it be, advisedly : for assuredly a sweet-toothed Bishop, though attired in full panoply of episcopal state, would find it difficult to shut his teeth in time on that small wee word whose offer of assistance is so prompt in moments of tension, when he found a much-looked-forward to toothsome morsel a black crawling mass of ants ! I've seen tears come to the eyes but I digress.



In this paragon of a godown ants were present : and if here, one thought, where will they not enter ! Energy and resource is their motto

and here they proved it ; for surely not one of the hermetically sealed tins that had been in the godown for a week or two had been left untried ; the bright wrappers had been eaten off in minute holes or in thin streaks in the search for a possible opening ; a bag of sugar left unwarily open was a seething crawling mass of black, with a thick black moving waving stream, flowing both ways, disappearing from it to a dark corner.

The ant in question was that tiny minute insect about 1/8th inch long which has one of the most unerring *flairs* for sugar of any animal, save a child, I know of. Where he comes from and where he goes to must often have puzzled many millions of the human race in their day. Stand a sugar-coated cake, a bunch of grapes or any other sugary comestible on a table in the average sun-dried mud-brick built bungalow in the districts in India and it will not be



long before some wandering member of an out-post picket of this small species will have discovered it. And the article need not contain sugar either. Any and every scrap appears to be worthy of attention from this omnivorous insect. If he can lift or move the prize, off it slowly goes. Whilst engaged in his often Herculean task he may be joined by a friend or two. If the article proves above their capabilities, they will depart. Wait and watch a little and you will see them return reinforced, running eagerly to left and right, but keeping a more or less generally correct direction till they arrive at the prize they had left.



The one instinct which then seems to animate them all is to fix their jaws on to the prize and pull. They do not appear to know how to shove ; they can carry an article in the required direction but not shove it. Consequently the sight is witnessed of a general tug-of-war in which the majority win and make a gradual

progress in the required direction whilst the remainder are either fixed to the prize with their legs waving futilely in the air on the lookout for a purchase or are pulling in a contrary direction awaiting some turn of fate, which with a collapse and roll of the prize gives them the required leverage and proper direction. The size of the object these small insects will carry away to their nests is positively marvellous and it has to be witnessed, and can be witnessed almost any day in India, to be credited.



Observation would seem to show that when they come upon a sugary prize they usually feed, *i.e.*, extract and eat sugary particles from it there and then. Perhaps, for which there are other well-known instances in the animal world, they do not trust each other where

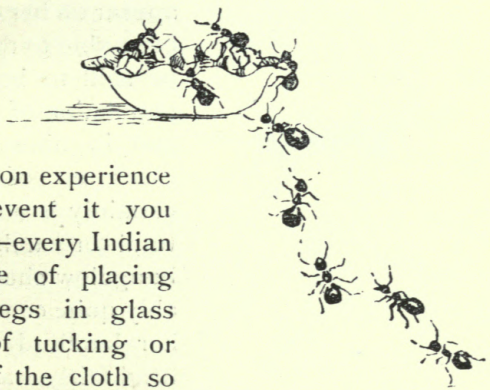


sweets are concerned! Any other articles of food such as old chicken bones, pieces of bread or toast, potato peel, old bits of dried skin, dead or incapacitated caterpillars and other insects, etc., etc., they carry off to the nest for the food of the community at large. These nests are made in cracks and holes in walls and floors, in cracks and holes in the beams and rafters or posts and lintels of the bungalow, and it is from such places that the hordes issue forth on their predatory excursions.

The other large black ant of the bungalow, he with the big head and general fierce ruffianly appearance, also occupies similar quarters. All is grist to his mill, and he has little hesitation about robbing weaker brethren or of helping himself to sugary dainties. He is as common a visitor as the little beggar,



but is perhaps most numerous in Upper India during the rains where he will invariably make his appearance on your well-arranged dinner table and feed greedily from your natty silver dishes of figs and plums and dates. To the careful housewife it is particularly exasperating on her return from the Club to enter the dining room to inspect her table before proceeding to dress, and find all her dessert dishes a mass of black ants! And yet this is the common experience of many!! How to prevent it you will ask? You will know—every Indian servant knows—the dodge of placing the feet of your table legs in glass saucers of water; and of tucking or pinning up the corners of the cloth so that they shall not *touch the floor*. Also of only putting the dessert on the table just before the guests arrive. But then it is often forgotten altogether and the



appearance of the table spoilt, and if not forgotten, the ants often arrive and dispute with your guests the right to eat it; and they have the start, since they like their dessert early in the proceedings and most of us do not care for their leavings.

Many people seem to look upon it as a reflection on the housewife when ants appear on her dinner table. I have never been able to discover why! She cannot be said to be answerable for the insect population of this land or for its vagaries, and in nine hundred and ninety-nine cases out of the thousand she most certainly is not answerable for the structural or architectural beauties of the bungalow she is occupying. She is probably quite content if she can prevail upon her landlord to keep the roof over her head fairly watertight and to put something else on her walls than the disfiguring whitewash, which makes our houses look like the prison cell: and many of us are not so fortunate as to be able to do



this! Surely she cannot be considered to be answerable for the state of the walls in which the ants congregate and build their comfortable, cosy and busy dwellings! !

From my cogitations on the Ant World and their diligent perverseness I was aroused by hearing the voice of my friend raised in lamentation. Her fair head was, I was going to say, was buried, in an immense tin canister, or so it appeared to me. From its upper end a most distressed countenance emerged and I was invited, as an expert this time, to come and inspect. At the bottom of the vessel I saw a layer of a white substance which I took, and correctly so I was informed, to be flour.

Now, I knew little about flour in those free and easy salad days and I don't know that I know much more about it now. I was, however, aware that it made bread after being subjected to various processes. Also I would have said that it

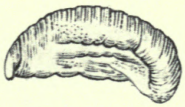


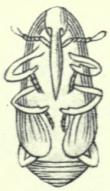
was not a product of the animal world. And yet this flour was alive and other knowledge that I possessed soon led me to solve the riddle here presented. The bin was nearly empty, but it had been used for flour for years, and its present state served to indicate that this had been the case, for it was a crawling mass of the well-known Weevil and another smaller flour-eating red-brown beetle, known as the Biscuit Beetle. There were also present one or two predaceous insects which feed upon the weevil and were to all appearances thriving amazingly on the accumulation of diet presented to them. In fact, the flour bin contained as large and happy a family party as I had witnessed for some time. My hostess informed me that the bin was never emptied as when low it was refilled again. This served the weevil and his partner's notions of hospitality to perfection. I could not help speculating on the number of weevils I had consumed in various tasty



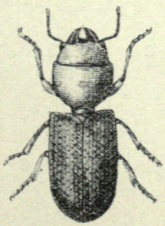
and toothsome dishes I had from time to time partaken of at my friend's most hospitable board!

The life of this little weevil is a very simple one. The female lays her eggs on various grains (rice, corn, wheat, etc.), in little indentations made with her jaws; the grub eats into the grain, becomes full grown, changes to a nymph or pupa, both stages shown here, and then emerges as the weevil shown above. The insect is common all over India. The brown biscuit beetle has much the same life history. The predaceous beetles of which I show two here, the wheat beetle and the saw-toothed grain beetle, pass through a similar life-cycle to that of their host, but their grubs feed on those of the weevil and red beetle instead of on the grain itself, and these habits account for the merry family party present in my friend's flour bin. The insects shown are much enlarged.





I suggested as a means of getting rid of this family party that the whole of

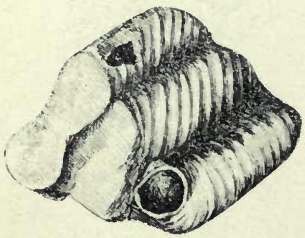




the contents of the bin should be pitched into the fire or into a pail of boiling water and that this procedure should be followed in future when the insects again made their appearance in the godown.

The Verandah, broad and spacious, is *the* feature of an Indian bungalow and is often one of the pleasantest of spots to lounge in ; or would be were it not that at certain seasons the insect intruder is apt to prove a most undesirable companion. Bees and Wasps will probably be amongst the first of such acquaintances to spring to the memory.

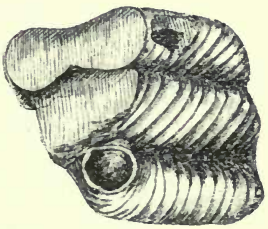
Amongst the commonest of the little Bees in the latter part of the rains is that funny little beggar the mason bee (Megachile) which forms little clay or mud masses on our walls in any and every conceivable cavity which he thinks will suit him. We must all of us at some time or other have taken up a book and found the leaves stuck together by





what appears to be a little mass of mud situated in the hollows between the two covers. If we break this little mass open as we probably do at once, we shall find it to consist of several elongate cells placed side by side. If, further, we examine these cells, we may find in each either a little store of pollen and perhaps honey and a small grub or a large white maggot or a bee ready to emerge. This is the little mason bee.

The female bee makes these cells, half fills them with pollen, lays an egg in each, seals them up, and her life's work is over. The grub on hatching out from the egg feeds on the store of pollen thus provided, and by the time the store has been consumed, it is full-grown and changes into a nymph, from which the bee gradually matures ; when mature, it eats a hole in the mud wall and escapes. If you examine one of these sets of cells some time after the mother bee has made it, you will see that each



cell has a hole in it at one end from which the matured bee has escaped.

This little bee has a companion in the well-known leaf-cutting bee which I have alluded to in the chapter on the Garden since his forays extend into that region.

There are several of the Wasp Group which have the same habit of making clay cells in which to deposit their eggs, one or two of which are common visitors in our verandahs in the monsoon months, but they provision them with other things than honey; live green caterpillars being one of the chief delicacies provided for the future grubs. These wasps have the same aptitude for seizing upon available crevices or holes—*punkha* holes in the walls, rifle barrels left unwarily upright in a rack without a protecting plug of cotton wool in the tops of the barrels, books standing in the library bookshelves (I have found the insects a perfect plague in this latter way), hollow bamboos used in the thatch

roof, all are serviceable sites to build in.

Some of these wasps *(Eumenes)* make little rounded cells of clay for their nests, placing caterpillars inside them. The cell being made, the female wasp repairs to the garden and searches our flower beds or vegetable garden for a succulent green caterpillar. Alighting gently upon him when found, she stings the grub on the nerve cord and thus paralyses him. Seizing the caterpillar between her legs the wasp then conveys him to the cell and places him in it; others are placed alongside, an egg laid near by and the cell closed. Paralysing the caterpillars in this manner keeps them alive and ensures that the store of food thus provided for the grub which will emerge from the egg shall remain sweet and good and not decompose too soon. This provision of food enables the grub to reach full size, when it changes into a nymph and the latter into a wasp resembling its parent; the former then eats a hole



in the mud wall and escapes from the cell.

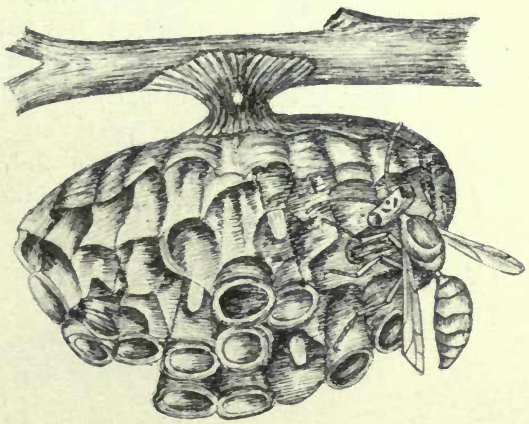
Some of the Fossorial parasitic Wasps, instead of storing their cells with caterpillars, and the wasps which act in this way are most useful friends to the gardener, fill the cell half full with tiny grey spiders, as many as 20 of these latter being placed in the cell in a paralytic condition to serve as food for the wasp grubs when they hatch out from the eggs laid.

Allusion must be made to another Wasp, perhaps the best known of all verandah intruders in his season, which is from early July to late November in Northern India. I mean the long-legged yellow (Polistes) wasp which swarms at times in startling numbers in our verandahs and rooms and appears to be everywhere. He is a honey eater as all who have ever inspected his cells will know.



This wasp is the architect of those wonderful little pendant pyramidal combs

which one finds so commonly sticking to the timbers or ceilings of the verandahs or bath rooms. Beautifully made little nests these, and their mode of construction can be easily watched. Three or four shallow cells start from a little central stalk, the work of one wasp. This is a female who has survived from a preceding nest. Having built these shallow cells, she lays an egg in each and then commences to construct others, at the same time lengthening the walls of the first made ones. In this manner some dozen cells are made and in a few days will be seen to contain grubs. These the female now has to feed on sugary materials. In a week or ten days the grubs will be full grown and will change into nymphs and then gradually become perfect wasps. During this period the old female is still adding to the nest and feeding



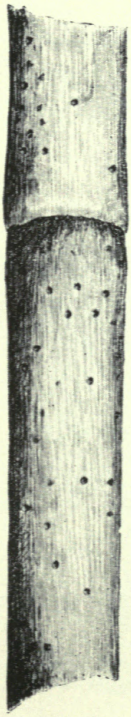


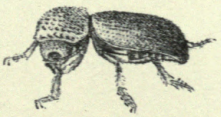
other larvæ. As soon as the first wasps mature, however, they undertake these duties and the old wasp now solely occupies herself with laying eggs in the cells as fast as the workers build them. This nest continues until the cold weather when the whole of the workers die off, a few females only living through the winter to found the nests of the following year. Such is the life history of our common Indian social wasp as it is called —the long-legged yellow denizen of our verandahs which rarely stings.

I have often been asked in the course of my Indian experience—What is the little insect which bores shot holes into our bamboo furniture and into the bamboos and timber work of the roofs of thatched bungalows, resulting in little showers of dust descending upon one's tables, chairs and floors below? Insidious little pests are these belonging to the beetle tribe and, although so minute in size, owing to the prolificness with which

they breed and the gregarious manner in which they live and work together, their attacks, both to the bungalow and to the furniture, are at times very serious and cannot be neglected.

The worst of these pests and the ones of chief importance in the bungalow belong to one family of beetles, though the insects boring into bamboos are smaller in size than, and different in species from, those which riddle the timber. The method of life of these wood-eating beetles is much the same. The mature beetle bores into the bamboo or timber, making a small circular orifice in entering which has all the appearance of a shot hole. When a number of beetles have entered the same bamboo close together, the latter looks as if it had had a charge of No. 8 shot fired into it. On getting into the interior a quarter to half an inch, the beetle turns to the right or left and, eating out a short gallery in the wood-structure, lays eggs ; from 20 to 60







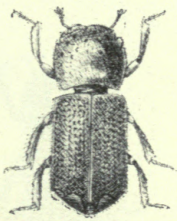
per female, according to the species, are laid in this gallery. The eggs hatch out into grubs which feed upon the woody fibres and structure of the bamboo or wood, reducing them to powder and thus undermining the strength of the article attacked. When full fed, the grubs pupate inside their tunnels in the powdery mass in the interior and here gradually change to mature beetles. These latter bore their way out of the bamboo and either seek out another to tunnel into to lay their eggs in their turn, or, if space and good wood is still available, they tunnel into the same bamboo or timber in which they themselves were reared, selecting a suitable hard spot. From five to seven such generations or life cycles may be passed through in one year.

This brief glance at the life histories of these beetles will at once explain how it is that our bamboo furniture gradually becomes pitted with an ever-increasing number of small shot holes from which

powder drops when we move the infested object. The beetles generally select the shady and unexposed portions of the table or chair to tunnel into, and this is the explanation which the hostess should offer in her own extenuation when her nervous caller has measured his length on the floor owing to the untrustworthiness of the legs of the inviting soft-cushioned, silk-bedecked and befrilled but, alas, 'shot-holed' bamboo couch.



But these beetles are even more of a pest up in the roof of the bungalow than they are in the house or verandah, for the attacks to the furniture can be kept in check by rubbing turpentine or kerosene over the affected parts and injecting it into the shot holes.



This is by no means a possible remedy when we come to consider the roof insects. Of course, the species infesting the bamboos in the roof are the same as those in the bamboo furniture. Those in the timber are, however, different and usually larger

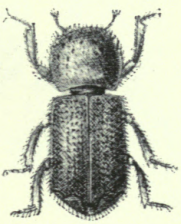
in size, their front upper parts being heavily rasped with projections, and the beetles being squarer and bulkier in appearance.

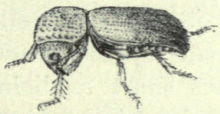
These timber beetles pass through from three to four generations in the year or there may be five, the number of course depending upon the climate of the locality in which they are living and on the species ; it being a general rule that there are more generations of an insect in a year in a damp hot climate than in a cold dry one.

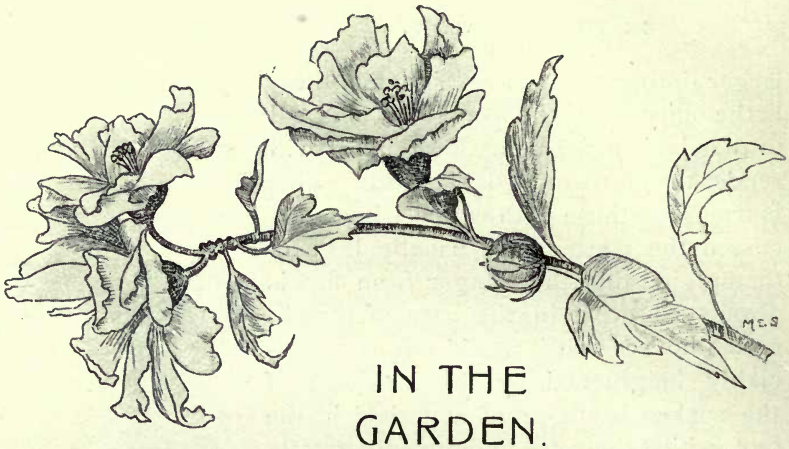
I have found that the best way to preserve the timber and bamboos in the roof of the bungalow and the timber uprights, etc., is to soak them for a more or less long period in crude Rangoon oil. The articles should be first thoroughly soaked in water (and more especially is this necessary with bamboos) for a couple of days and then soaked for 48 hours (in the case of bamboos) in the oil. The period would be longer for the small poles used in the roof and longer still for the



larger timber portions. Of course, there is the objection to the use of this material in thatched roofed bungalows that it will render the house more liable to fire. This is true, but those with whom I have discussed the matter have usually been of the opinion that the danger from fire is always so great in the case of thatch-roofed houses that it would not be appreciably heightened by the inclusion of the soaked beetle-proof materials in the roof, whilst their use undoubtedly greatly lengthens the life of the latter. (The beetles are shown here enlarged.)







IN THE GARDEN.

IN the early rains our gardens in North India suffer from a most pernicious pest and one which will be well known to all gardeners—I allude to the black and Orange Banded Beetle. This insect is one of the oil or blister beetles of which we have a small representative in England. It possesses some medicinal properties and is dried and crushed up and sold medicinally in the bazars of this country.

The beetle is partial to mallows (*Hibiscus*), feeding on and destroying the flower-



buds, leaves and petioles and stripping the rind from the green shoots. But in years when this banded robber is numerous, it by no means confines itself to the mallow, but devours flower-buds of all sorts, doing great harm to cucurbitaceous and leguminous plants, to rose bushes, and even seeks out trees! I have seen the green fruit of the Artocarpus peeled and stripped down to the stone by half-a-dozen of these beetles clustered on one fruit.



The insect stays some 6—12 weeks (July to October) in the garden and during this period commits a considerable amount of damage. The beetle lays its eggs in masses either on the soil or on grasses and low herbaceous plants. The grubs hatching out from these eggs are very active, but little is known about them.

This orange and black ruffian requires a good deal of watching, and I have found the best way of dealing with him is to put on a few *chokras* to collect the insects

when they first begin to appear in the garden. Each boy should be given a pail of water mixed with a little kerosine, and the beetles as soon as collected, should be thrown into this. With a little care and close supervision a garden can be cleared of the pest in this manner in ordinary years. The owner should, however, endeavour to get his neighbours to do the same, otherwise he will suffer from invasion from areas outside his own territory.

Most people are fond of roses and many there are who will take trouble over this beautiful flower to the exclusion of all others. In the late rains and early autumn whilst the trees are putting forth the effort which gives us those beautiful blooms, often the most perfect of the season, there are several insects to be on the lookout for.

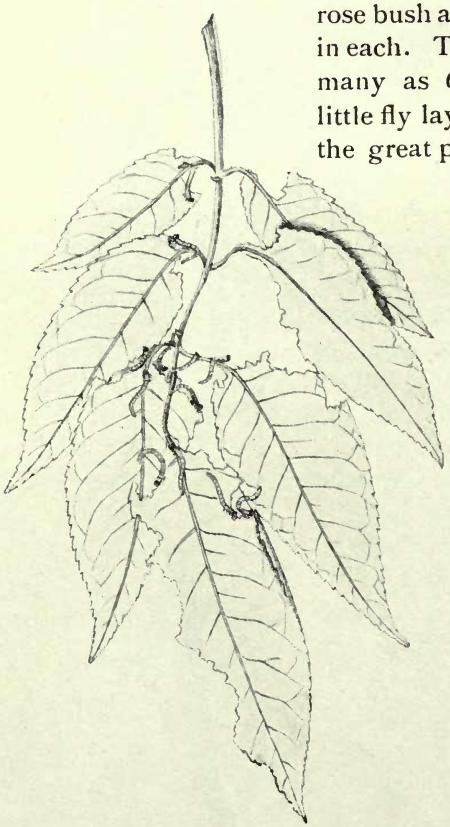


The first is a small green caterpillar which appears about the first week to middle of July. Sometimes in

countless numbers it invades and entirely strips the trees of their leaves. The caterpillars work up a long rains shoot, of which we have perhaps been particularly proud and which held out the promise of many perfect blooms, and eat all the green leafy portion down, leaving only mid ribs, stalks and green stem intact. A plant showing these naked long shoots can be easily recognized as suffering from this pest. This caterpillar exactly resembles a small butterfly or moth one. It is, however, neither as it has several pairs of legs, more than the 8 pairs possessed by the latter. It is really the grub of an insect known as a Saw-fly.



The eggs are laid on the leaf stalk. The little saw-fly



female has a sharp pointed instrument at the end of her body, and by means of this she cuts two rows of parallel diagonal incisions down the long green shoots of the rose bush as shown here and places an egg in each. These incisions may number as many as 60—70. In other words, each little fly lays as many as 60—70 eggs and the great powers of increase possessed by this insect are thus easily accounted for. The tiny grub possibly feeds for a few hours in his little cradle in the stem before he quits it to devour the leaves in the manner detailed below.

After the young larvæ have left the cells, the remains of the epidermis over them peels off, the cells shrink, and you see on the stem a brown patch consisting of an elongated elliptical depression occupied by two

rows of parallel little cells which have turned brown ; two such depressions are to be seen in the drawing shown on page 59.

The young caterpillars on hatching are comic little chaps and may be seen feeding together in a row on the under side of the outer edge of the leaf. They are at this time quite small, about 1/8 inch in length with black head and front segments and green behind. At this stage they only hold on to the leaf by means of their front 3 pairs of legs, the rest of the body being held up at an angle to the leaf and being waved about from side to side as the grub feeds. As they grow older, the caterpillars separate and spread over the plant, usually one or two feeding together on one leaf. They always commence on the outer edge of the latter and eat it down to the mid rib on either side.

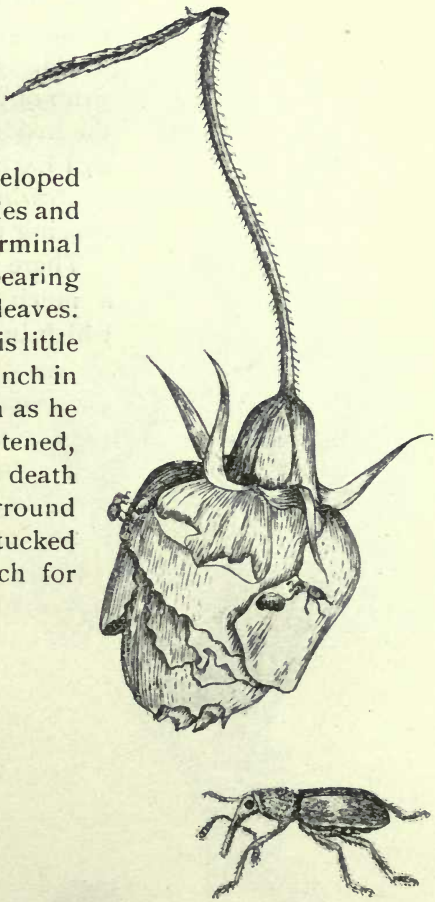


The caterpillar grows to full size in about ten days to a fortnight, and further generations of the grubs will be found in

August, the latter part of September and about the middle or 3rd week in October. When the caterpillars are full grown, each spins a small cocoon, attaching it to the shoot or leaf stalk by means of a few silken threads. The fly (shown enlarged on page 61) comes out of this cocoon in about five days or even less.

This little caterpillar is a real pest to the rose bushes, as complete defoliation means the loss of many fine autumn blooms. Spraying the plants with soap suds, tobacco juice, or dilute kerosine is a good remedy for killing the caterpillars if one is possessed of a sprayer. Those who have not one will find that the caterpillars can easily be collected from the bushes and killed at the *beginning* of the July and August attacks, if they are marked down then. Once, however, the caterpillars have been allowed to get to the third generation or fourth, one must not look for any fine blooms from the trees for the rest of that season.

There is another small pest of the rose bushes in autumn, and he is an insidious little foe on account of his small size. It is a tiny black Weevil who sits on the shoots and flower buds with a light airy grace, his little head, with its fine straight snout, tilted out at an angle of enquiry. This little pest drills holes through the rose buds before they have opened, and whilst still enveloped in the green calyx and also girdles and kills the delicate young red terminal shoots with their short stalk bearing the two or three delicate young leaves. Only close search will discover this little pest, as he is not more than ⅛th inch in length. He is not easy to catch as he is quick on the wing, and if frightened, like so many of his kind, feigns death and drops from the plant to the ground beneath with legs and antennæ tucked away close to the sides. Search for him there is hopeless.



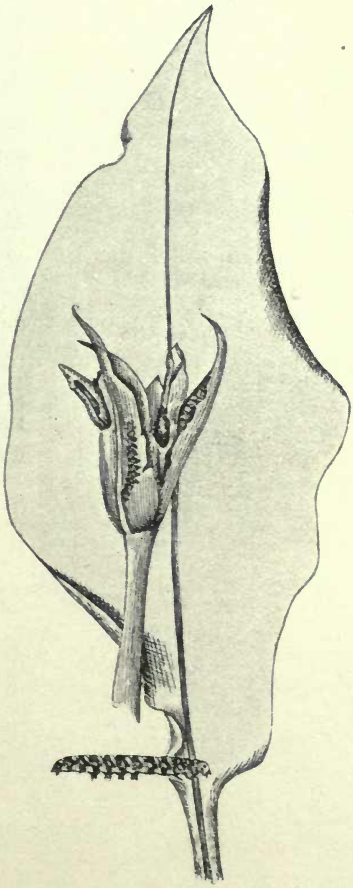
I have found that the best way to circumvent him is to place a white cloth on the ground beneath the rose bush and then shake the bush several times sharply. The weevils true to their nature will drop on to the cloth and they should then be quickly collected and killed. I have not discovered where the grub of this beetle lives, but it may be in the inside of the shoots and of the petioles as I have found numbers killed by a small grub which eats out the heart of them, causing them to dry up.



There is another of this tribe of beetles, a much more fearsome looking brute, which in North India confines itself to the tree mallow (*Hibiscus syriacus*), appearing on it in the early rains. This is a large bulky globular black Weevil, the back of him covered with knobby projections and the thick snout being curved and held

vertically downwards. This insect strips the rind off the shoots of the tree, attacking the green petioles and flower-buds and stalks. When numerous, the result of the work of this pest and that of the banded blister thief, for they will be found together on the tree, is that the foliage of the plants becomes scantier and scantier and the flowers, those that are left, open with cut and dishevelled petals, the blooms being an eye-sore on the plant and useless for the table. Collection as employed for the banded oil beetle is the best way to get rid of this unwelcome visitor, which owing to its considerable size —half an inch long—is easily seen.

Of Caterpillars in the garden their number is legion, but there is one which is occasionally pre-eminent during its periods of abundance. I allude to a silky black beggar vividly picked out with orange and red and white spots and little stripes. He is a striking object this, and once seen in any numbers, is



not likely to be forgotten. The heaviest of monsoon showers cause this grub no discomfort, and he appears to be pretty well omnivorous, though succulent flower-buds are his specialty. He is a gregarious creature, loving to feed and destroy in companionship, and because of his latest exploit amongst the Girl's pot plants I depict him here.

This year this caterpillar has been far from conspicuous, but the autumn brought him to light right enough. I found a happy family party of a baker's dozen of various sizes in the sheath enclosing a number of the flower-buds of the beautiful white star-clustered Eucharis lily. When found, the spoliator was immediately destroyed, but only one out of that cluster of flower-buds was saved. The others had the heart eaten out of them and were totally destroyed.

Succulent lily buds and all buds of this nature are beloved of this pest, and he is ever found abundantly on the beautiful

rains-flowering Pancratium lily. The destruction he commits in the flower-buds of this beautiful plant is at times appalling, whole flower heads being destroyed or reduced to tattered remnants by the caterpillars. Thanks to his gaudy colouring, which is probably a warning colouration to choke off birds from trying him as a delicacy, he is easily seen, and I think hand picking can be usefully tried or a mixture of tobacco juice. Soap suds are useless. He thrives on them! He turns into a little chrysalis and this into a winged insect and must be got rid of at once in the caterpillar stage when found.

I have noticed that one and all of these rains garden pests appear to suffer seriously from a long drought. The drought which commenced with the cessation of the rains in Northern India about 20th August 1907 and ended with the breaking of the rains on the 19th June 1908 appears to have been

particularly deleterious to some of the garden monsoon insect pests, for in 8 years I never saw such fine flowers in the gardens of Dehra during the monsoon or so few of the yellow and black-banded oil beetles, the large black weevil, the small one, and the saw-fly larvæ, though the latter appeared to have suffered least. This is worth noticing because a long drought is generally favourable to the increase of most insect life. It may be that drought is unfavourable to those forms which appear in our gardens more particularly during the rainy months and live and feed on the external parts of plants. It would appear to be a reasonable surmise perhaps.

Locust and Grasshopper pests are ubiquitous in India, and one and all of us who have any love for our Garden will have seen, and suffered from, their depredations. There is one little pest, green in colour but smaller than the green

'songster' which visits our rooms at night so often in the rains and springs his discordant notes so metallicly and suddenly on our ears.

This little garden Locust has a pointed snout and short feelers, and he feeds with avidity in the autumn on dahlia blossoms, cutting down the petals and giving the flowers a most ragged and dishevelled appearance. A tiresome little brute this, and he has many confrères who cheerfully eat down our young annuals as soon as they appear above ground. A mild solution of arsenic sprayed lightly on blossom and seedling will not come amiss to get rid of these curses to our garden's welfare, for in early autumn many of them will be found to be wingless or to bear little sprouting wings on their backs. This means that they have several weeks of





feeding before them in this 'hopper' stage, for as yet they cannot fly, and this feeding is to be done at our expense on our pet plants and blossoms. Whether they have got short horns, when they are Locusts, or whether they possess long fine ones, when they are Grass-hoppers, they one and all feed on greenery and are there but for the one purpose to endeavour to put to shame our gardening efforts.

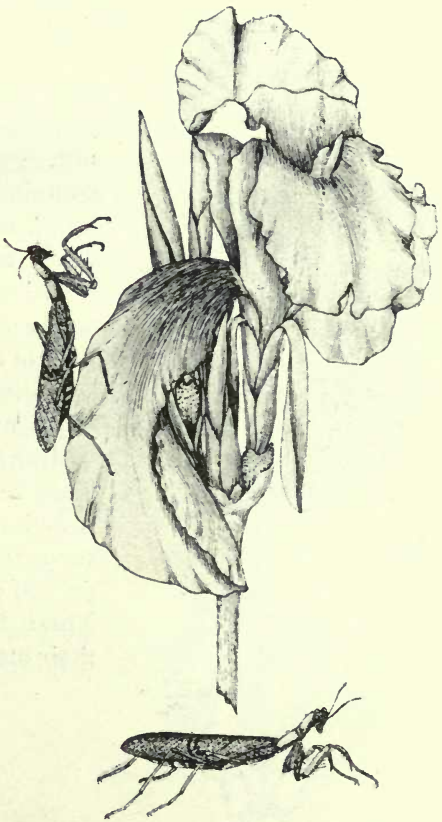


Of course, all the insects one finds on one's plants or running about on the seed beds are not present as the enemies of the gardener!

For instance, the little black Beetle often seen running over the beds or to be found amongst dead leaves is a predaceous insect and feeds upon various insect pests—bugs and others of the garden and field. Its elongate whitish yellow grub is also predaceous in its habits and feeds upon noxious pest grubs.



The weirdly built Mantis or Praying Insect, to which we have already had occasion to allude, is another gardener's friend. He may be seen taking up his position on some leaf or gaudy brilliant flower where, assuming a thoughtful attitude, he awaits what the gods or the brilliant attractions or perfume of his flower will send him.



These flower-haunting praying insects are often very handsomely coloured, the marking and colourations being in harmony with those of the plant structures on which they take up their position. The one shown on the Canna flower is a beautiful little mantis which is quite common and may be often seen

shikaring slowly over the brilliant flowers during the rainy months.

The observant gardener will have noticed on his rose leaves at intervals during the monsoon a little cluster of 8—12 round white translucent objects looking like a little cluster of a child's tiny white beads. These little clusters are eggs. It is possible that they contain some poisonous matter in them inimical to birds and to ordinary predaceous insect life since they are invariably deposited exposed and easily visible on the leaf and yet they do not appear to get eaten.

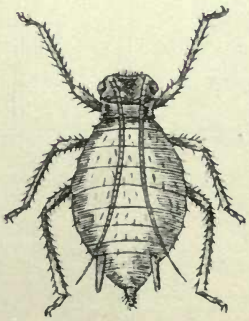


If these little clusters are watched, one day a number of small blackish insects will be seen to emerge from the eggs. They remain for a short time clustered round the broken outer coverings, but soon acquire strength enough to wander off separately over the rose bush. These little insects are Bugs, that is, their mouth parts consist of a proboscis

or beak which in this case is sharp-pointed : for they are predaceous bugs and feed on plant lice or blights, as also does the little yellow and black Lady Bird beetle shown on the chrysanthemum stem in the figure.

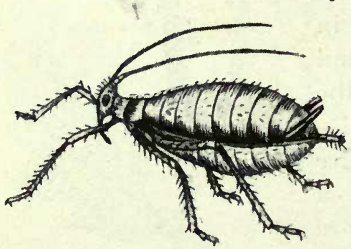
Everyone knows the small sap-green Blight of the rose bush, which cluster on the under sides of the leaves and on the green succulent stems through the summer months, and the black blight which infests the upper parts of the stems and flower stalks of chrysanthemums in the autumn. These little insects spend their lives sucking the sap from the plants. The females lay young lice instead of eggs, and these latter mature and commence producing young in a week or ten days from birth. They are a dangerous group of insects, so much so that Huxley calculated that the produce of a single blight, or Aphis as it is called, would, in the course of ten generations, supposing all the individuals





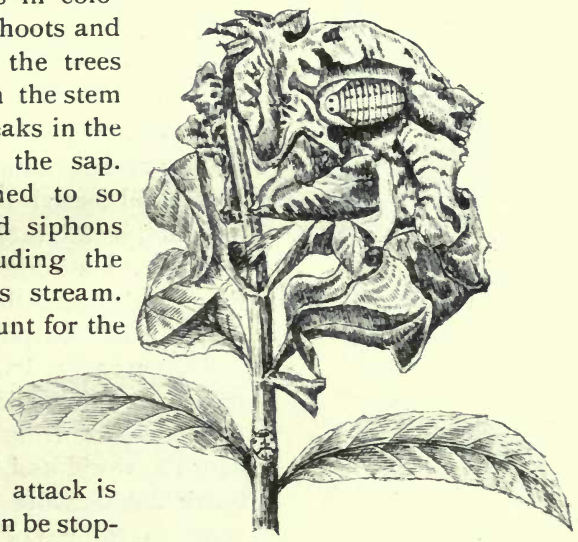
to survive, "contain more ponderable substance than 500 millions of stout men, *i.e.*, almost more than the total population of China ! ! "

The little bugs we have seen developing from the egg cluster described above feed upon these pests of our rose bushes and chrysanthemums and thus form a most useful servant and friend to man.

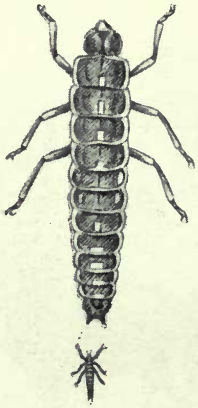


Those of us who have apricot and peach trees in the garden will have noticed in the spring, when the tender new leaves have clothed the ends of the young green branches with a delicate green tracery, that after a time these leaves commence to bunch and curl up into unsightly cork-screw sticky masses which gradually turn yellow brown to black and die. In cases of severe attack the whole of the new spring growth may be lost in this way and a very poor crop of fruit or no crop at all will be the result.

This loss is entirely caused by one of these small blights, a tiny greyish yellow insect which clusters in colonies round the new shoots and on the new leaves of the trees and piercing through the stem or leaf insert their beaks in the tissue and suck out the sap. They may be likened to so many little animated siphons sucking in and exuding the sap in one continuous stream. The exudations account for the sticky state of the curled up leaf masses and of the older leaves and branches of the tree. If the attack is discovered early, it can be stopped by spraying the trees with a kerosene emulsion mixture made as follows :—Boil a solution of soap and water, add kerosene up to 10 per cent., churn up the mixture and then spray it





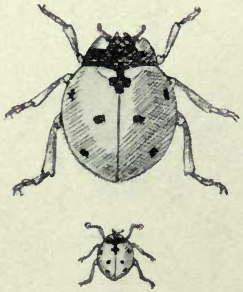


on with one of the common hand-spraying machines.

If you observe this Aphis attack carefully and open out the curled up leaf masses, you will almost certainly find in them some bright red or yellow spotted oval beetles, the common little Lady Bird beetles of our nursery days and rhymes. Never kill these! They are most useful beggars, as are their grubs, grey, active, elongate, six-legged little objects, for they feed upon the plant lice and are there for this purpose alone.

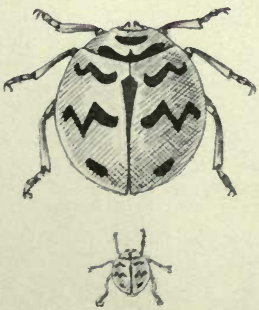
A common red one with 7 black spots on either side of its back (shown here natural size and enlarged) is spread all over the world and is a friend of almost incalculable value to man. It is the commonest one of our homeland and the friend of our nursery days. Others there are, red and orange and pale yellow with varying black marks on their wing cases. They are all friends and should be treated as such.

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An insect which is much in evidence in the garden during the latter part of the rains, or perhaps we should say that the signs of its work are very noticeable at this period, is the little Leaf-Cutter Bee (Magachile). This little insect decorates the leaves of our roses by scalloping out the edges, small almost circular pieces being cut out by the bee for architectural purposes. The prominent and handsome white leaves of the Mussaenda which serve to attract insects to the minute yellow flowers of this shrub are also treated in a similar manner by the leaf-cutter. The insect cannot be said to cause harm since it is rare to find the defoliation committed on any one tree heavy; nor is the work of the little insect-artisan unsightly, since the piece taken out is beautifully circular and symmetrical, no ragged and jagged edge being left to offend the eye, as is almost invariably the case when caterpillars are at work.





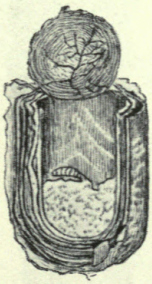
It will be asked—Why does the bee take the trouble to cut out these circular pieces of leaf tissue since the insect itself is not a leaf-eater? The answer is simple and explains a most ingenious method of nest making. The bee usually builds in decaying dry wood, making use of cracks or holes in it or using the hollow interior of a bamboo or the hollowed out interior of a sapling tree or dry perennial. Easy ingress and egress is attained by a natural or artificially made hole on one side.



The leaf-cutter is very like an ordinary bee to look at and the bees to be seen at the end of the rains buzzing about the wood work of our

verandahs are, many of them, the leaf-cutters searching for a suitable site for house building. Having determined on a site, the bee now sets to work on its leaf-cutting operations. The hole or tunnel selected has to be thoroughly lined with leaf sections and these are cut circular, elongate, or semi-circular, according as to whether they are required to form the bottom or top or sides of the cell. So true is the cutting of these pieces that they have all the appearance of having been stamped out with a die, and the instinct which enables the little bee to accomplish this work and to fit the pieces in the tunnel is nothing short of marvellous.

Each little cell when made, consists of several circular or oval pieces at the bottom with semi-circular ones for the sides and several circular ones to fit over the top in the form of a cap above. Before these latter are placed in position, the cell is about half filled with pollen and an egg laid in it : for the cell



is the future home of the grub which will hatch out from the egg and the pollen forms the store of food provided for it. By the time this store is exhausted, the grub will have become full grown and will pupate, to issue as a bee the following season. One tunnel may contain five or six of such cells end to end, each lined and capped, and containing a portion of pollen and an egg. The mouth of the tunnel is finally closed with a little mud, when the work of house-building and egg-laying will be complete.



The reason for lining the tunnel with moist green leaves is to prevent the food with which it is provided—pollen brought from the flowers in the garden—from being absorbed or from drying up too quickly. That insects should have reached this knowledge and have developed an instinct enabling them to counteract this drawback is wonderful, but the precision and dexterity of the leaf-cutting business

is almost incredible. The rapidity with which the bee, with its mandibles, cuts out the section, itself meanwhile hanging on to the piece which is severed so that, as the last snip is given, it half falls, half flies away with it in its legs; the skill with which it rolls the pieces into tubes and pushes them down the tunnel; the exactness with which it cuts the final circular pieces just to fit the orifice, all are wonderful.

If you want a lesson in dexterity or patience or to observe for yourself one of the almost incredible things Nature's Store-house has to show, track the leaf-cutter bee from the rose bush or Mussaenda shrub in your compound to her building site in the verandah and watch the various stages in her building operations.



Curious are the superstitions which have become attached to insects and surely amongst the most curious is that which attaches to the Earwig, the insect so commonly associated with the dahlia at home. It has been hated throughout generations and credited throughout generations with climbing up into the human ear, living there and producing deafness. How the superstition ever arose it is difficult to imagine, since it is probable that the wax in the ear is a sufficient protection for it and would soon suffocate an insect; for the latter breathes through openings situated down each side of the body and these would soon become clogged up.



The most wonderful part of the earwig is the marvellous manner in which the under wings, which are ear-shaped, are folded up. The upper ones are quite short and scale-like in these insects, and consequently the under ones have to be most complexly folded beneath them.

The neatness and dexterity of this folding is one of the most curious and beautiful things in the insect world, the wings when opened out being as large or larger than the insect itself.

Earwigs are very active, fast-running little insects, some of whom are carnivorous and others eat portions of plants and commit damage in the garden. Some of the smaller species appear to be greatly attracted by light and make their appearance in our rooms and on our dining tables at night. You will find that these insects are also often introduced into the house from the garden with the cut flowers for the table, in the corollas and calyces of which they were lying *perdu* when the flowers were picked.

I have dealt with some of the above ground pests of our plants and alluded to a few of their insect foes.

Let us now go below soil and see what the lower portions of our favourites have

to contend with. The point is of importance since we have so often to bewail lost seedlings or, even worse, seed patches, whole sowings disappearing without our having the faintest idea of where they have gone to. It is not *always* the much maligned *mali's* fault.

I remember one morning whilst pottering about the garden imagining I was gardening, hearing a tragic and tearful voice saying—

"Oh, dear, do come here. Some nasty thing has eaten off some of my best white lupins!"

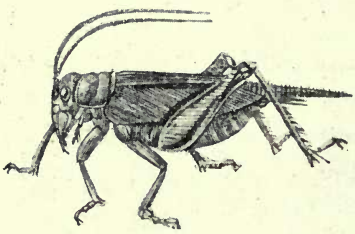


It was the Girl's first year in the country and her first experience of The Gardener's Trials in the East. I hastened to the spot revolving in my mind the various satanic pests who might be the cause of the note of tragedy in a voice where nothing tragic should ever be.

It was as I had surmised! The young seedlings were cut down just above the soil and left lying on the spot, though a

few had been dragged away to a distance. Following carefully the direction of these seedlings and searching closely around, the home of the aggressor was soon discovered, a round orifice in the soil leading down to depths below, the opening disguised by some small weeds.

A cunning brute this insect, and amongst one of the worst, for he is one of the Crickets—those pests of the garden and field which, feeding upon young plants, are capable of committing such serious mischief when present in any numbers. Fetch a spade and trace the opening downwards and you will find a gallery or tunnel projecting downwards into the soil inclined at an angle with several zig-zags in it. Some 2—3 feet down the tunnel ends in an enlargement in which scraps of plants may be found ; or portions of seedlings may be discovered in the tunnel itself or projecting from the orifice at the top, dragged there by the cricket to feed on at leisure.



The enlargement at the bottom of the tunnel is where the insect spends the day, two or three occupying it together whilst young, but only a male and female when the insects have matured, *i.e.*, when they have acquired their wings.

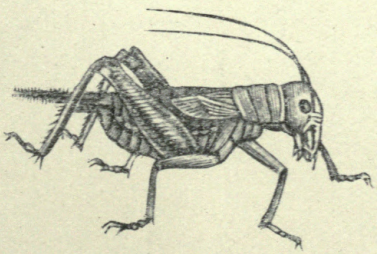
The young cricket starts life as a little 'hopper' not unlike the young grass-hopper or locust 'hopper' and you will notice that he is then wingless. As he grows in size, he sheds his skin at intervals, his wings begin to appear and increase in size at each moult till they are finally full-sized and functional as flying organs. During the whole of his life the cricket lives in tunnels in the earth in the manner above described, issuing forth at night, or in the day time in dull cloudy weather, and feeding on young plants. The insects are most wasteful feeders and will cut down numbers of young plants in the way we found the white lupins cut down, eating



but a small portion of one or two of them.

Perhaps, the most commonly dangerous garden cricket in India is the large smoky brown brute which is distributed throughout the country. It is a large thick insect about 1½" in length when full grown. This cricket, both in the young and adult stage, is insatiable and the amount of young growth it will destroy is almost unbelievable. Rows of seedlings will be cut down and destroyed in a single night by a colony of these pests, living either in tunnels made in the soft seed beds themselves or more probably in some neighbouring sandy patch of soil covered with weeds or low jungle.

It is not sufficient, remember, to look for the habitations of these insects in the seed beds alone! If there, you will see the orifices. If not, careful search must be made for them even if the search is carried for a radius of 50 or 100 yards from the scene of the depredations.



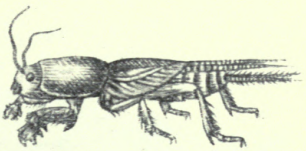


This large cricket is a powerful brute when full grown, and the hoppers even in their younger stages are hardy little beggars and will hop a long distance in search of succulent seedlings, amongst which they probably place our young annuals high up in their Menu of tasty delicacies. The smoky brown cricket is not the only pest of this nature we have. There is a common little black chap, very plentiful in the country and perhaps more addicted to fields and cultivated tracts than to the garden. It is an easily recognized insect.

Another pest of this *jat* is the little Mole Cricket which resembles our English insect and lives very much in the same manner, destroying roots by his burrowing proclivities. He is also carnivorous, and the male is addicted, when he gets the chance, to devouring his offspring.

Have you ever closely inspected this curious little animal? He is more like a

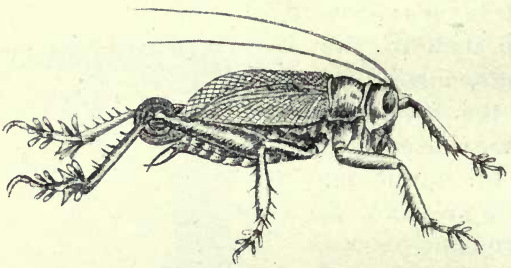
cross between a lobster and a crab than an insect; his front legs are flattened out into broad curved saw-edged digging instruments, the front part of his body alone looks like the top shell of the lobster, whilst the wings, instead of being placed flat against the back and sides, are rolled up on either side exactly as you would roll up an umbrella. Truly, a quaint little beggar and as malicious and harmful as quaint.



There is yet another cricket monstrosity, or rather it resembles a cricket although it is really of the grasshopper tribe, and I cannot refrain from breaking my rule and giving its Latin name, as the latter is as monstrous as is the appearance of the insect itself, to wit—SCHIZODACTYLUS MONSTRUOSUS!!!

Did you ever hear and have you ever tried to pronounce such a mouthful before?

This is the largest of the three and goes by the name of 'bherwa' in the



Indigo districts of the country and elsewhere. It is almost as much a curiosity in its way as the mole cricket and is built on a tremendously powerful scale, its legs being strong and long and very powerful, and the head and body broad and thick. The most curious part about the anatomy of the insect, however, are the tremendously long wings. So long are these that if held straight behind it when in the position of rest, they would project a long way beyond the extremity of the body. In order to get rid of such awkward appendages and to ensure their safety, for they are membranous and frail, the insect rolls them up in a spiral manner and you see at the end of its body two large spiral coils generally coiled up in a careless slovenly manner. The

appearance these dishevelled coils give to the insect is indescribable, but he is never forgotten once met with.

This pest resembles the large smoky brown cricket in the amount of damage it is capable of committing amongst young plants. I have seen lines and rows of young seedlings cut down and destroyed in a night by the 'bherwa' and he is an insect very rightly dreaded by planters, agriculturists and gardeners of all sorts.

These three samples of what the cricket world is like and how many live will be sufficient, I think, to put one on one's guard against all the villainous tribe.

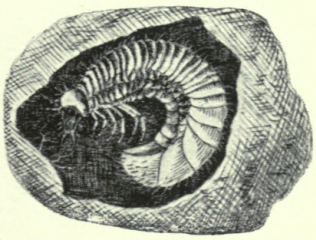
It may be asked—How is one to prevent or get rid of their attacks? Some place portions of young seedlings of, say, some common vegetable in the neighbourhood of their pet seedling beds in order to attract the crickets and preserve their seedlings in the beds. If the branches are poisoned, by dipping in lead arsenate (a white powder, 1lb. of which

should be mixed with 100 gallons of water to make the mixture) or some other poisonous mixture, a number of crickets may be got rid of by this means. It has to be tried sometimes when the crickets visit the garden at night from some neighbouring tracts of jungle in which it is hopeless to expect to be able to find their holes.

If, however, the crickets are living in the garden in some sandy tract of soil, or in the seed beds, the best way is to put on a *chokra* to hunt them up. Give him a pot of water and a small bag and tell him to pour a little water down each hole he finds. The crickets will at once run up to the surface in a terrible fright at the sudden inundation, and they can then be caught and killed and placed in the bag. It is absolutely essential to make the youngster produce his 'bag' and to pay him only per head of the 'kill,' or you will find that the crickets will increase instead of decrease in the compound or nursery.

We have not yet done with our unwelcome nocturnal guests of the garden and must now turn to the beetles who number amongst their ranks some grubs which vie with the crickets in their capabilities for destruction. These grubs, however, confine themselves to the soil and are not to be found at work above ground.

Most people who garden in the true sense of the term, *i.e.*, who do the actual work of sowing and pricking out, etc., themselves, will have come across in the course of their operations curved white grubs with yellowish brown heads, 3 pairs of short legs on the front portion of the body following the head and with the hinder part of the body swollen up into a curious kind of bag arrangement. These grubs often prove themselves an unmitigated curse in the garden, as they feed upon and destroy the roots of young and old plants and cut down seedlings. They are the larval form of



Cockchafer beetles, those brownish or yellow beetles of square bulky build which often fly into our houses at night and go booming about the room after the fashion of the scavenger beetles.

The cockchafer beetles themselves mostly feed upon leaves and are by no means so important to the gardener as the grub. The latter spends its whole existence in this stage in the soil and, when full grown, changes into a pupa or nymph in the earth without forming any special covering or cocoon round it. This nymph gradually assumes the shape and colouring of the beetle and often, in turning over the soil in the spring and summer, one can find all stages of the insect-grub, nymph and beetle, in the soil amongst the roots of plants.

The best way for the amateur gardener to get rid of these pests is by deep trenching the soil during the winter season and exposing grubs and pupæ to the cold which will kill them. Digging



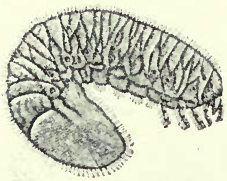
in lime is a good plan to get rid o them, but it is necessary to leave the beds so treated fallow through a rains in order to get the lime washed out, as it will of course kill all vegetation as well as insects.

Another pest similar to the cockchafer one is the grub of the well-known Rhinoceros beetle, the pest of the date and palmyra and other palms in India. This insect is more particularly to be found in those parts of the country where palms flourish, and here it can become a real terror.

I have seen Calcutta gardens in which whole seed beds have been destroyed by the grub of this insect, and on the East Coast of Madras it commits serious havoc in young Casuarina nurseries, let alone the enormous damage it does to the palm groves.

The grub is a large one, some 2½ inches in length when full grown, and probably spends some 8—10 months

in this stage, feeding all the time upon roots and young seedlings in a manner similar to the cockchafer grubs. The beetle lays its eggs usually in refuse or dying or rotten palm trees and the grubs hatch out in these positions.



It is a common sight to see a heap of decaying refuse in the corner of a garden in this country. The *malis* like to make their soil in this manner. If the heap is kept in a deep pit, there may possibly be little to be said against it. If, however, it is stacked in some corner above ground, it is certain that the rhinoceros grubs will spread from it to the seedling beds and commit irreparable damage. This I have often seen in Calcutta gardens and down in parts of the East Coast of Madras as well.

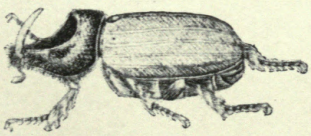


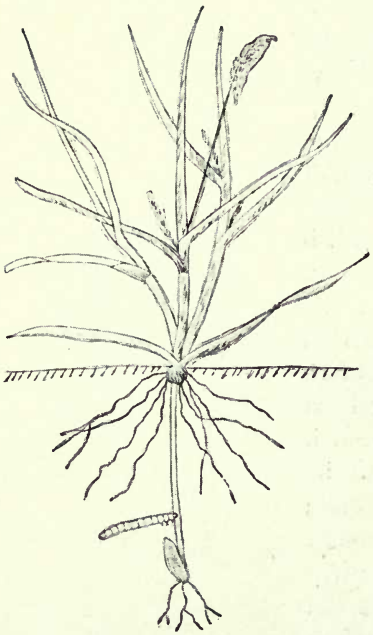
This rhinoceros beetle is, as I have said, a pest of palms in the country, as the beetle eats down through the heart of the crown of the palm, cutting large holes through the young folded leaves

which, on subsequently opening, have a most tattered appearance. When several beetles attack a tree in this way, the tree may die.

Cleanliness in the plantation is the secret of dealing with this beetle. All refuse should be burnt and dying trees and dead trees should be cut out and, if badly infested with the pest, should be cut up and burnt. Remedial measures of this nature of course require to be carried out throughout all the gardens of a locality to be really effectual. If a garden is properly cleared of the pest, it will not of course be so subject to its attacks as will a dirty, ill-kept one; but if the insect is allowed to increase in large numbers in neighbouring dirty gardens it is of course hopeless to expect to keep it entirely out of, and therefore from damaging, the well-kept garden.

We have not quite finished with the root-eating grubs. There is a little brown, elongate, very hard and shining



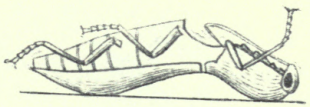


grub from ½ to 1 inch in length, thin and like a little piece of segmented copper wire. This insect from its appearance is known in England as the 'Wire Worm' and it acts much in the same way as the cockchafer, living entirely in the soil and cutting through and feeding upon the roots of seedlings and young plants.

The damage done by the root-eating pests is usually visible above soil owing to the fact that the young plants commence to flag, and if pulled by the head come away, when they are seen to possess no roots. Careful digging round the area will probably disclose cockchafer or 'wire worm' grubs or the common noctuid *Agrotis* moth grub to be described shortly.

The 'wire worm' grub, when full fed, pupates in the soil, forming no special covering, and the nymph eventually

changes into that small elongate, brown or grey beetle known as the 'Click' beetle or 'Skip Jack' owing to the fact that when the insect is on its back, it jumps up into the air to get over on to its legs again. This movement is necessary owing to the beetle having been provided by nature with extremely short legs which will not reach the ground when the insect is on its back. The beetle is thus quite unable to get into its normal position again in the manner usually adopted by insects of giving a heave or shove off on one side so as to right the ship.



To enable our click beetle to resume its normal position, nature has provided him on the under side with a little socket at the top of the body into which fits a little spiny projection from the thorax or head portion. When on its back the insect pushes up its chest so that it rests on the end of its head and tip of its body ; this position releases the spine from





the socket with a considerable amount of force which projects the insect up into the air ; when in the air, it turns over and comes down to earth again right side up.

The last of the common soil pests which are to be usually met and dealt with is the smoky curved grub known as the 'Cut-Worm,' about an inch in length, which is often dug up at the roots of plants and sometimes waxes in great force in the garden. This grub is really the caterpillar of a moth with dull smoky brown wings, and it can be recognized as a caterpillar owing to the fact that it will be seen to possess 16 legs in eight pairs, whilst none of the grubs we have already considered possess more than three pairs of legs. The insect passes through at least two generations in the year ; that is, the moths are to be found on the wing in the garden at least twice a year.

The grub feeds for some two months on young plants, cutting them through

near the base, from which it gets its popular name of the 'cut-worm.' It drags cut-off seedlings down its burrow in the soil in a manner similar to that we have seen the large cricket doing, portions of the plant often projecting from the mouth of the tunnels. When full fed it builds a little earthen cell in the soil and changes into a red brown chrysalis in this. About 2—3 weeks are spent in this stage and the moth pushes its way up through the light layer of soil which is all that separates the chrysalis chamber from the surface and escapes into the garden to mate and lay eggs on the soil near some young seedlings. The winter is spent in the grub stage in an earthen cocoon and deep trenching of the soil and exposing these hibernating grubs to the air will be sufficient to kill them off at this season.

White Ants are of course as much a curse and a plague in the garden as they prove themselves in the house;

that is, from the gardener's point of view when he is not the owner of the house ! The termites infest our well-drained beds and destroy the plants above ground by eating off the succulent bark, having run up on its outer surface their usual covered way galleries. Or they attack our growing plants below ground.

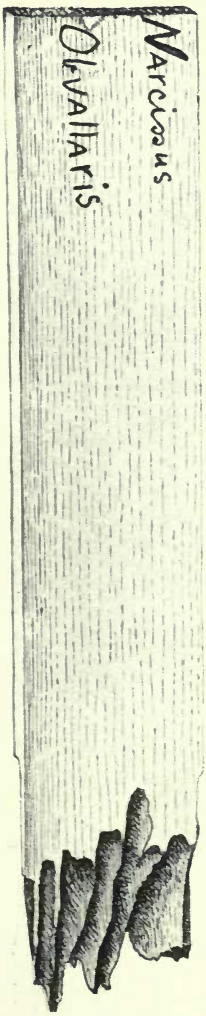
In the Dun White Ants have, for some reason as yet not understood and certainly not appreciated by our gardeners, a strong partiality for the Annual Chrysanthemum, and it is apparently a common experience to find young plants lying on the beds cut off in the manner shown here. Our *mali's* device, which is effectual to a certain extent in the case of some plants, is to water the beds with a solution of copper sulphate.



Destruction of this nature is sufficiently annoying to the gardener, but our

friend's efforts to arouse the latter's ire do not stop at his plants ! They go for his labels as well ! !

You will have often found the bases of your stakes supporting pet plants, and your wooden labels, carefully marking the sites of choice bulbs and seeds, eaten through as shown here. It is the work of friend 'white ant,' and he loves above all things the soft 'deal' wood of our English packing cases.

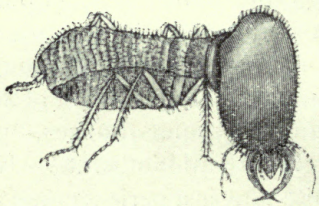


In a similar manner of course this creature makes match wood of the posts supporting summer houses, pergolas, jafferey work of all kinds, etc. In a word, the White Ant is a perfect curse and I am seriously thinking of indenting on the most hard-up Railway Company I can find for old rails to settle once and for all the ever cropping-up question of the pergola posts.

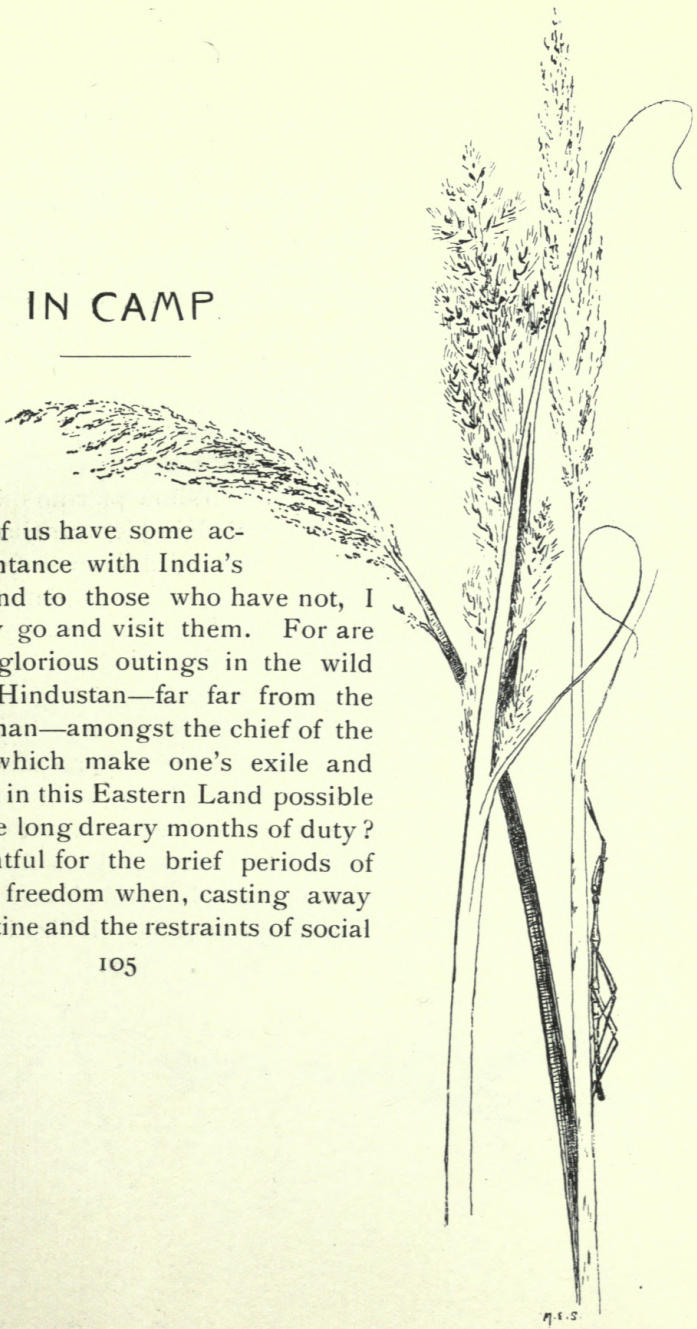
The Girl, with a grim determination to be even with the Fiend, as she terms him, and a reprehensibly reckless

disregard of the cost of a furlough trip, has already indented largely for the latest thing in aluminium labels from Home!

I fancy these will puzzle our friend!!



IN CAMP



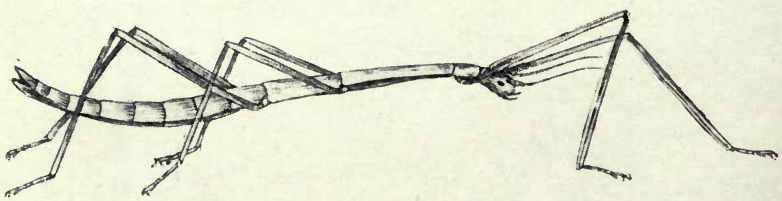
MOST of us have some acquaintance with India's Jungles, and to those who have not, I can but say go and visit them. For are not those glorious outings in the wild tangles of Hindustan—far far from the abodes of man—amongst the chief of the pleasures which make one's exile and pilgrimage in this Eastern Land possible through the long dreary months of duty? And delightful for the brief periods of leisure and freedom when, casting away official routine and the restraints of social

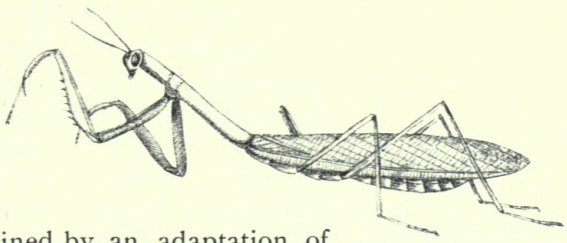
intercourse and amenities, one turns one's face with relief to the fastness of the jungle.

Here we find Insect Life in its purest untrammelled freedom. If we wish to meet those curiosities and freaks which abound in the Insect World, it is to jungle bug life that we must turn. In the jungles we come at once face to face with some of the most marvellous creatures Nature has to show ; for no other class of the Animal Kingdom includes even a tithe of the weird forms of life which can be counted amongst our friends the Bug Tribe of the Jungles.

Take the types depicted here ! Surely relics of a prehistoric age when the Icthyosaurian swam in slimy tenebrian pools and the Pterosaur, flapping heavily through giant carboniferous forests, carried with him the secret of aerial flight—that still unsolved problem of the acutest intelligencies of our much-vaunted present-day civilization !

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Curious as the Mantis or Praying Insects are, their present appearance has most probably been attained by an adaptation of parts through a continuous series of minute changes in order to enable them to obtain their prey, which consists chiefly of other insects, with the greatest facility. They are cumbersome and heavy on the wing. Some in fact are wingless. Therefore it will not be on the wing that the means of subsistence will be sought. The insects have evidently discovered that by acquiring the colouring of their surroundings and by developing a mode of progression which is at the same time as slow as old Time itself and yet as rapid as the lightning flash, lay their best chance of securing their prey. This the family have succeeded in doing in a most marked degree.

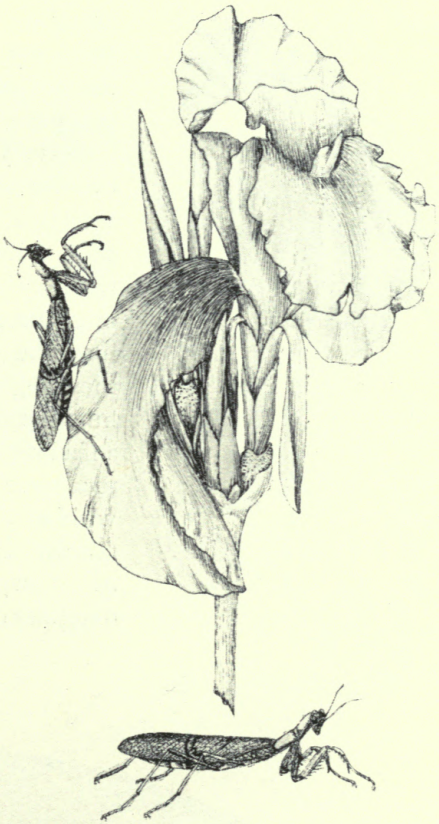
As regards colouring the forms which live on trees or amongst rocks are of that peculiar smoky brown or grey which is par excellence the most difficult to 'spot' when the insect is quiescent—almost impossible in fact save to a highly trained and observant eye. And yet some of the smaller tree forms are often met with in camp especially at *al fresco* lunches in the jungle where one may often see an intruder or two (such as the small one shown enlarged) on the snowy table cloth, his protective colouring here making him all the more visible.



Again, the foliage dwelling forms have acquired that peculiar vivid tint of green with perhaps yellowish and brown markings which enables them to lie *perdu* on leaf or green twig till some unwary insect approaches within their reach; finally, there are other vivid and beautifully coloured banded or spotted species which are usually found amongst flowers, such as the one here shown on the Canna

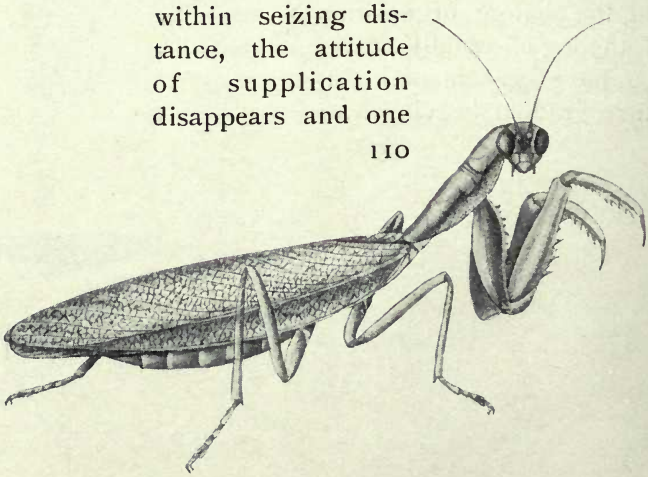
flower, which are usually only noticed when they betray their presence by some sudden movement made in fear or to seize their prey.

It has been said that their movements are very slow and yet may vie in speed with the lightning flash. Have you ever watched a mantis shikaring ? Only the hind two pairs of legs are used for progression. On them he heaves over very very slowly so that the movement is scarce perceptible, and then, just as his centre of gravity is nearly lost, out shoots a leg like a lightning flash. It is difficult to see the movement, but the change of position of the leg effectually proves it to have been made. Another gradual heaving over



of the whole body and another lightning-like movement of a leg. And so the advance is made step by step until the prey is within reaching grasp of the terrible forelegs. A movement which it is impossible to analyse, it is so rapid, and the prey is seen struggling helplessly in a grasp from which there is no escape.

Have you ever inspected these forelegs of the praying insect? You will see that two long joints are so placed that they fold up one on the other. Each of them is furnished with sharp spiky teeth or spines, set backwards, which fit one into the other. The position in which these legs are held is one of supplication, but that prayer is wholly concerned with affairs mundane, for once they get within seizing distance, the attitude of supplication disappears and one

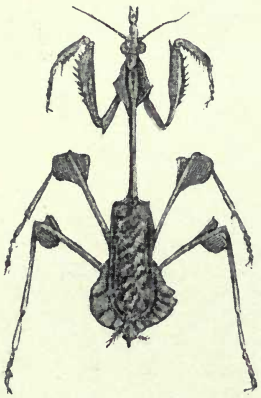


of fierce and ruthless power takes its place.

The method of feeding is not pretty and is certainly rough on the captured. In fact, one's only hope for the latter is that its sufferings are soon over, and the knowledge that the nerves and sensitive masses of insects are not as delicate as our own. Having secured his feast, the mantis sits well back on his hind-legs and proceeds methodically and slowly to tear it to pieces without troubling to administer any preliminary *coup de grace;* in fact, he will only feed upon a quivering and palpitating mass, and in this differs from many of his confrères of the mammal class.

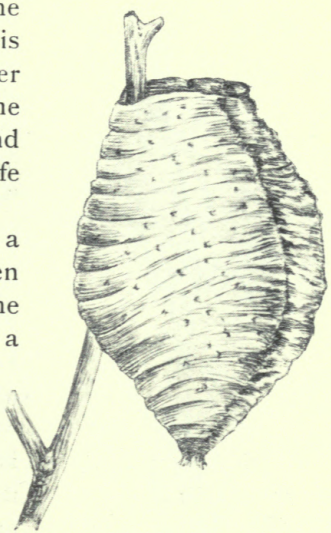
The utter callousness displayed by this insect is of the most cold-blooded order. I have seen a mantis who happened to dine uninvited with me one evening in camp, after satisfying his appetite, seize and maim and throw away insect after insect apparently merely in

sport or to keep his hand in. He never attempted to eat them or to kill them outright, the crippled creatures hobbling away as fast as they could the moment they reached the table cloth. Now and then he missed his prey and this seemed to incite his choler. In the callous contempt of his attitude to the lesser insect life crawling and fluttering around him on the white cloth, he reminded me of nothing so much as one of Walter Scott's lordly Feudal Barons of the Dark Ages.



Some of the mantises simulate flowers. In the year 1877 Dr. J. Anderson showed to the members of the Asiatic Society of Bengal a most curious mantis (shown here half natural size) from the neighbourhood of Midnapur in Bengal whose under surface has the appearance of the corolla of a pink papilionaceous flower. The position usually taken up by this insect is to hang head downwards amongst green foliage, either motionless or swaying gently as if blown by the

wind. The purpose of the mantis is clear. The similarity to a flower attracts insects, apparently chiefly flies, on the search for honey. Alighting with this object in view, if indeed the fly is ever permitted to alight, lo and behold the flower is in full and active motion and the drop scene closes down on the life of that unwary fly !



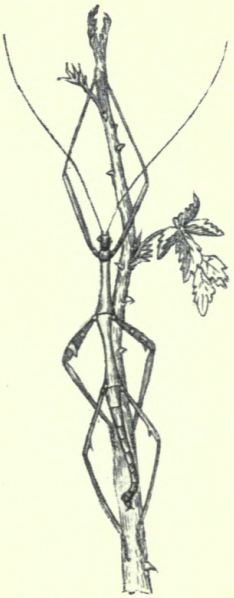
The female mantis lays her eggs in a curious manner. You may have seen attached to twigs or grass stems in the jungle filmy, frothy, foamy masses of a delicate green or yellow colouring looking like an elongated lump of coagulated soap suds. The mass is very soft and can be easily crumbled between the fingers. This is the egg case of the mantis. She lays her eggs in a frothy mass which takes this shape and dries and hardens sufficiently in the air to retain it. The little mantises on hatching out drop out of the egg case which by then has dried and shrunk to

such an extent that it contains numerous little holes and crevices.

Unlike the mantis the Stick and Leaf Insects do not often visit the abodes of man. It is on our jungle forays that we shall find them in their haunts if we keep our eyes open. During the silent wait for a beat whilst we have nothing to do but watch and examine the forest or tall grass around us, our eye is suddenly attracted by an apparently moving piece of stick or length of yellow grass stalk.

We watch. All is still. And yet we are prepared to swear there was a movement of some kind. We watch and wait and look and wait, and at last there is another movement. We gently stir up the grass or jungle with our rifle muzzle, for we are interested. A sudden short rush never very far rewards us. The insect in its fright detaches itself from the jungle to which it is clinging, and there we see a piece of stick or straw on the move!

Wonderfully similar is it in shape, looks and colouring to its environment. A close examination scarcely enables our unaccustomed eye to distinguish eyes or head or mouth. Which is the head end? Only a movement discloses it and the position of the legs for we now see the front pair forwardly directed and the two hindermost pairs pointing backwards as shown on the grass stem at the head of this Chapter. A wonderful adaptation of nature and not acquired to enable the insect to drop upon its unwary prey, for these peculiar beings are herbaceous feeders and defoliate trees and plants.



There is a record that the cocoanut palms in Fiji and the Friendly Islands have at times been completely defoliated by one of these brutes, the inhabitants, who largely depend on these trees for their subsistence, being left to starve.

Fancy a famine brought about by stick insects! We wonder what the little

Tin Gods (my caligraphy is none of the best unfortunately and my typist transposed these last words into 'Tree Grubs'!) seated on the Olympian Heights would say when faced by such a conundrum. Those numerous and bulky tomes—yclept the Famine Reports and Guides and Rules for Guidance—are silent as to what should be done!

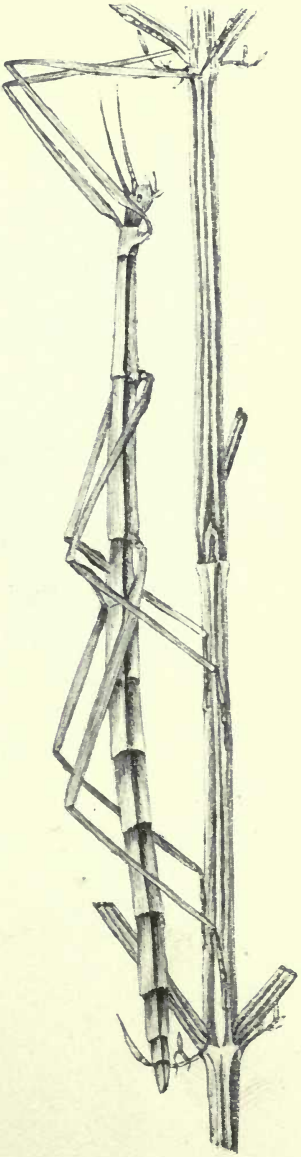
We think the Bengali Babu would have some reason in such a case for a wire to the effect 'Lakri kiras in fields. Please wire steps to do.' The Junior Secretariat Walla would be put to it!

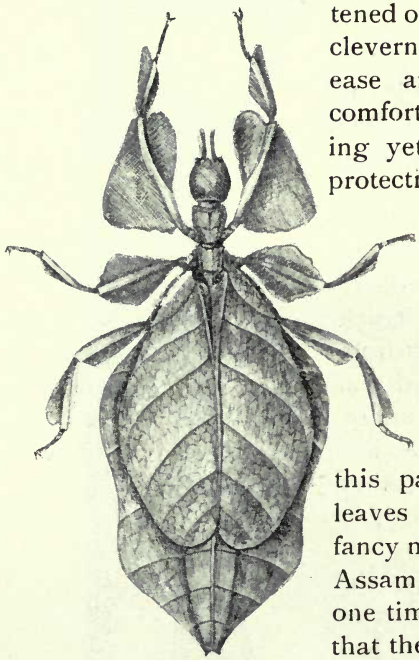
Of all sizes are these curious insects, from half an inch or less to the Assam one shown on the next page, of 8 inches in length.

By the way the stick folk are cleverer than man in one respect. If they lose a leg they are able to grow another in its place! What glorious risks one could take if one could do ditto and had six legs to play about with!!

The Leaf Insects are no less a source of keen interest to naturalists than their confrères of the sticks. That the great ingenuity and trouble they have been at through countless generations of Darwinian minute transformations and adaptations to arrive at their similitude to leaves is most marvellous and praiseworthy who can deny! And you may be tempted to ask why! Why has such tremendous trouble been taken? The reason in the case of the Stick and Leaf Insects is of course entirely one of self-protection. They feed out in the open on trees and plants where, but for their wonderful protective devices in copying their surroundings, they would be quickly snapped up by birds or parasitised by insect foes.

The world famous Leaf Insect, the Phyllium shown overleaf, closely resembles in appearance and colouring a leaf or one might say parts of several leaves. You will notice that even the legs are





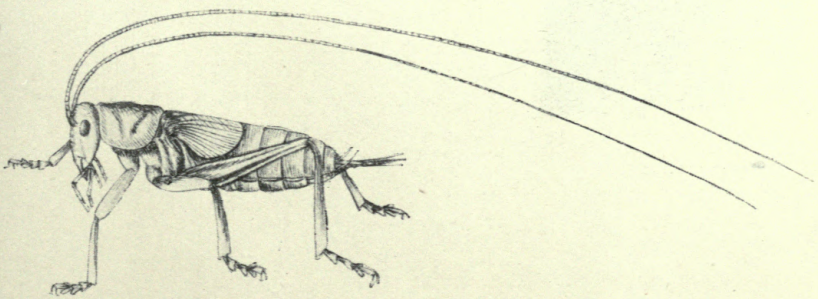
modified to look like portions of leaves, whilst the body and wings are quite flattened out and leaf-like. Man with all his cleverness and adaptability in living at ease and in comparative leisure and comfort upon his fellows has done nothing yet half as clever for his own self-protection as the leaf insect.

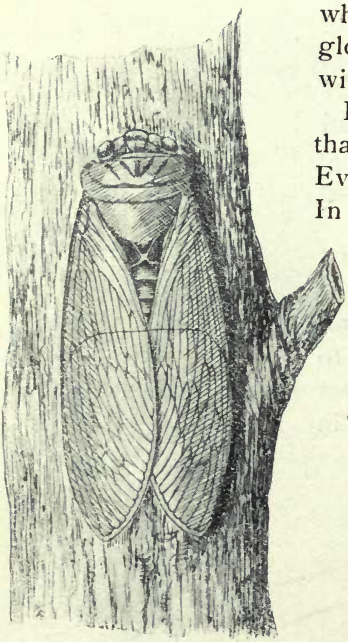
By the way while on district work in Eastern Bengal some years ago a native brought me one of these insects. On instituting a few enquiries as to where I might procure some more, I was told that the trees were fairly common in those parts, and that this particular one was only one of the leaves *which had taken to walking!* I fancy most of us in Eastern Bengal and Assam have been told this simple yarn at one time or another—there is little doubt that the native believes it.

There are tree-living forms of both Crickets and Cockroaches which, as a

means of protection and possibly in some instances with a view to obtaining their food, have taken on colourings and markings which give them a wonderful resemblance to the bark upon which they reside and run about. All who have been out in the jungles or even those whose jungle lore is confined to that assimilated in the garden will have noticed these insects. One curious point about them that I have observed is that they are usually adorned with a tremendously long pair of feelers as in the young cricket shown here. The feelers in many insects are supposed to be used as smelling and sensitive organs, but why they should be so exceptionally long as is the case in these forms is open to considerable surmise.

Whilst talking of tree insects we must not forget one of the best known, and at the same time the least known (to use an Irishism) of them all in India. I refer to the tree Cicada, that most curious insect who, in order to assert his charms in





the bosom of the fair female, produces that loud and often discordant whirring sound which in the minds of many Anglo-Indians is probably pleasingly associated with and reminiscent of the 'Hills.' It is all very well for those safely ensconced on the hill tops to anathematise the noisy wooing of this strange creature. But how many of us sweltering down in the scorching plains station have sighed for and longed to hear again that familiar whirr, precursor in our minds to the glorious coolness that is approaching with our climb up the 'Hill.'

I would not here be understood to say that the cicada is solely a hill insect. Every hot-weather shikari knows better! In the hot Terai forests at the foot of the hills he is, or some species of him are, at home and singing through the long hot weather and rains. Other brilliant green brothers are to be found at the same period in that Paradise of the Sportsman, the great Goalpara

grass jungles, and elsewhere in the plains of India. But the insects are perhaps mostly addicted to forest and to the foot hills and neighbouring mountains.

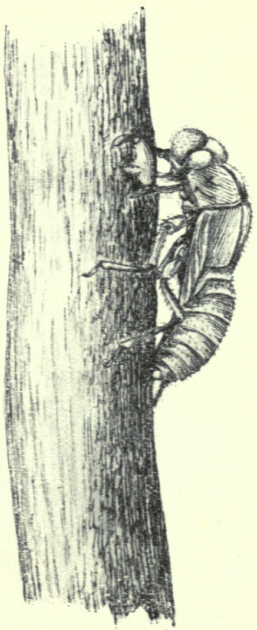
Only the male cicada sings. His spouse is dumb! This blissful domestic fact was known even to the ancients of old, for a Greek poet wrote—

> Happy the Cicadas' lives
> For they all have voiceless Wives ! !

Have you ever heard anything on the subject of the life history of these queer insects? It is as peculiar as is their appearance.

The whole of the young or wingless stage is passed in the earth, the insect having the appearance shown here. The grub probably feeds at this period on the roots of trees, but we know little about our Indian species.

I have noted, however, that the young of the common cicada of the Terai Sal forests live in the soil and feed upon the roots of this tree.



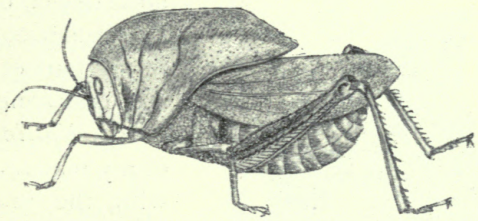
What is perhaps even more peculiar than the food eaten is the fact that some species are known to live for several years in the soil feeding in this manner, the period being the same for any given species. For instance, the Americans have what they term the 17-year cicada, the mature insect appearing on the wing above ground only *once* during this interval.

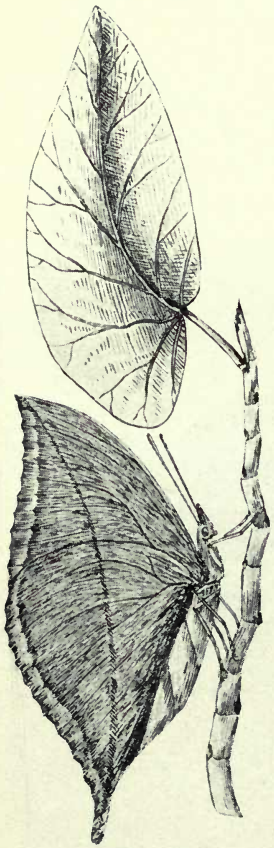
The grub moults its skin several times in the soil and then just before the last moult leaves the soil and crawls up the nearest tree trunk (see p. 121) or tall grass stem. The insect then sheds its last skin, *i.e.*, the last skin splits up at the head end and the now mature winged cicada, shown in the figure on page 120, crawls out and soon commences its weird song to attract a mate.

You will doubtless have often seen the last empty nymph skins on tree trunks (p. 121) and have wondered what they were, for they are to be found plentifully on trees affected by cicadas.

At all times of the year, but more especially whilst on shooting or fishing excursions, the shikari will have noticed the presence of the ubiquitous Grasshopper and Locust. He is perhaps to be seen at his best in India during the rainy season, for in the enervating damp heat when the jungle is at its rankest, numbers of different forms are to be found of all sizes and shapes, with at times queer hoods over their heads and often of the most vivid colouring.

The young locust and grasshopper usually resembles the parent exactly save that he has no wings; or they are but slight outgrowths lying on his back, which increase in size with each moult of his skin. Some of the young however differ considerably from the parent, the head and the thorax (the part behind the head) being greatly enlarged, and at





times corrugated and ridged and painted with the most brilliant of red and orange or yellow pigments.

Almost diabolically wicked is the aspect some of these creatures present as they cling to the stem of a tall succulent grass and glare out at you from their glassy cold fishy eyes, as in the case of the beauty shown overleaf. Often have I thrilled coldly all down the spine as one of these appalling apparitions has suddenly, at the end of some fabulous leap, alighted on the green sleeve of my shikar coat in the hopes of finding a most delectable feeding ground.

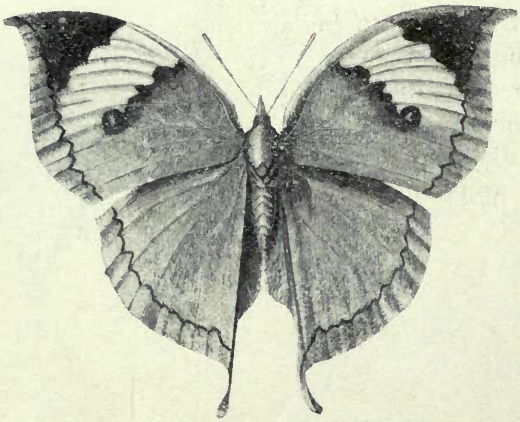
Another common insect of the forest in my part of India which has simulated leaves as a method of protection is the red brown *Kallima* or Leaf Butterfly. Many of my readers who have any acquaintance with the jungles will have noticed at times an insect resembling in its method of flight a moth more than a butterfly. It gets up suddenly at one's feet, one sees

a momentary flash of colour, orange and purple amidst a dark red brown, as the insect takes a sort of dashing swerving flight for a short distance and then suddenly dives to rest either on the ground or on the lower part of the trunk of some tree.

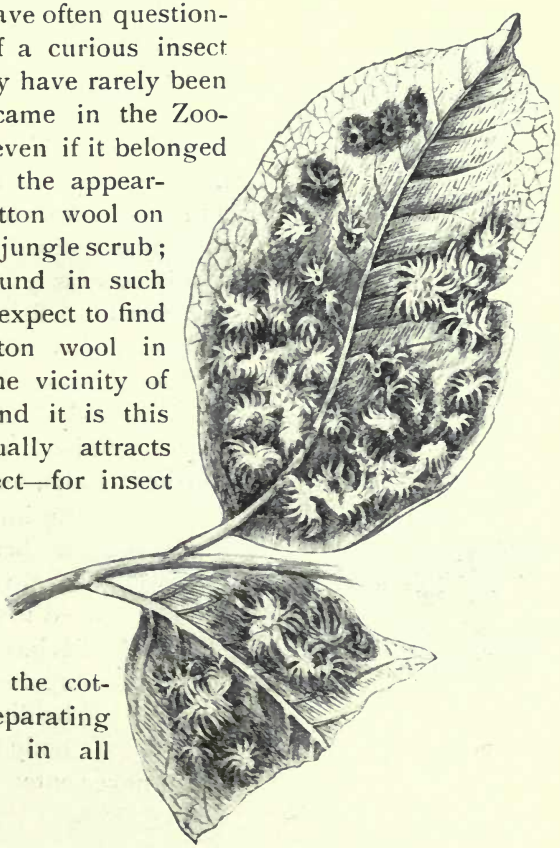
If one is curious, one makes for the spot and searches carefully about, but only dead leaves on the ground and the bases of the stems of the trees are to be seen. Suddenly at our very feet up rises the same glance of colour and the shadow insect makes another dash and goes to ground. If one is lucky, one may at last perceive a slight movement amongst the leaves as the butterfly closes down its upper wings on to the lower. All one sees is what appears to be a dead leaf with a short leaf stalk to it. A close inspection shows that the leaf has the ordinary vein markings and that it is apparently dry and dead but not shrivelled ; it is apparently lying

slightly inclined for the insect always rests in this position. The colour of the under wings may vary slightly, some being more greyish than others and the vein marks may vary slightly. The similarity to a leaf is however always perfect.

If the insect is caught and killed and the wings opened out (in a position of rest the wings of one side are always held flat against those of the other so that the upper sides are invisible) it will be seen that there are central orange and red patches of bright colour amidst the red brown, and it is these patches of brilliant colour that one sees when the insect suddenly rises in flight, opening out its wings to do so. Surely this insect must be included amongst Nature's most marvellous adaptations for protective purposes!



Shikaring friends have often questioned me on the subject of a curious insect or animal of sorts, they have rarely been quite certain where it came in the Zoological kingdom or even if it belonged there at all, which has the appearance of a mass of cotton wool on twigs and leaves of low jungle scrub; for it is generally found in such places. One does not expect to find masses of white cotton wool in jungles remote from the vicinity of the abodes of men and it is this anomaly which usually attracts attention to this insect—for insect it is.

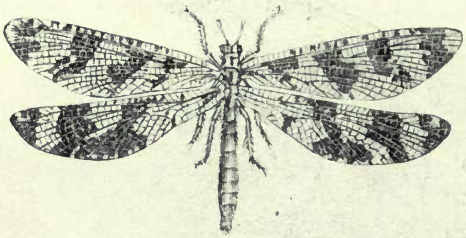


Many have found that if the wool is disturbed it hops or jumps and the sight may be witnessed of the cottony mass rapidly separating in a series of leaps in all directions!



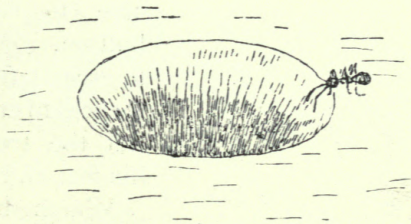
This insect belongs to the tribe of true Bugs, and it is one of the insects termed Frog-hoppers. It is only the young bugs that have these long cottony filaments sticking out of their backs and as they are gregarious in habits and feed together the cottony mass is thereby explained. This insect is deceptive in more ways than one since its adult or grown up form has ill-fitting green wings and looks like a moth (p. 127).

You will have often come across a kind of Dragon-fly-looking insect which is very common during the rains in Northern India, and is perhaps as much an intruder in the bungalow at head-quarters as out in camp since it is often attracted into the house by light. It has four large gauzy wings spotted with black and can be distinguished by its short body from the dragon-flies, which never enter the bungalow or very

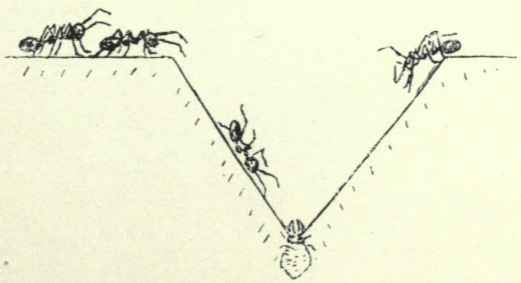


rarely since they are day-flying insects preying upon other species of their class ; and also by the fact that it does not possess their enormous head consisting almost entirely of two large eyes.

This intruder is the 'Ant Lion,' a frequenter of our English lanes. Not much of the lion about him you will say, and correctly so ; for the winged insect is harmless enough and only annoying from the fact that his awkward ungainly flight often brings him into one's face as he undertakes unwieldy aerial movements in the lighted room. He acquires his carnivorous name owing to the ferocious appearance and predatory habits of the grub or larva.



Have you ever noticed on a sandy path, in a sandy dry nullah or in sandy patches of the verandah of a much worn and dilapidated rest-house little inverted, cone-shaped



holes or depressions made in the loose sand. If you examine them you will see that the orifice at the top is perfectly circular about 1½ to 2 inches across with loose shelving edges, and that this opening trends inwards all round to a point at the bottom, the depth being about an inch and a half.

A casual inspection will not show you the architect of this beautiful little trap, but if you watch it for some time you may see an unwary insect running along the ground, approach too near the hole, slip over the shelving edge without being able to stop himself and fall to the bottom. With an insect's quick instinct to escape from danger he at once commences to endeavour to climb up the sides, but the treacherous sand gives beneath his feet and he drops to the bottom.

Watch the bottom and you will suddenly see a commotion in the sand and the intruder seized in a formidable pair of pincers. These belong to the gentleman

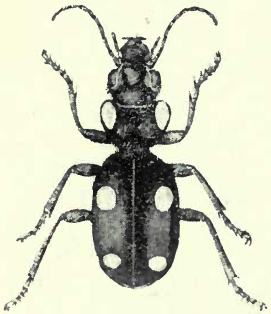
shown here enlarged, the 'ant lion' grub. He is the constructor of this ingenious trap, and having built it, he secretes himself at the bottom with only his pincers or jaws protruding out at the pointed bottom of the little pit as shown on p. 129. After seizing his struggling prey, he makes an incision into its anatomy and sucks it dry and then again buries himself at the bottom of his parlour and patiently awaits what a kind fortune and his own clever handiwork will send him.



The Animal Kingdom is made up of two great groups of animals, the predatory animals, and the preyed upon. In the Insect World, as we have already seen, this also holds good as the old popular jingle has it—

> Greater bugs have lesser bugs,
> And so *ad infinitum*.

It is too big a subject to enter on here, but it is worth while depicting types of two common predaceous groups met with in the jungles.

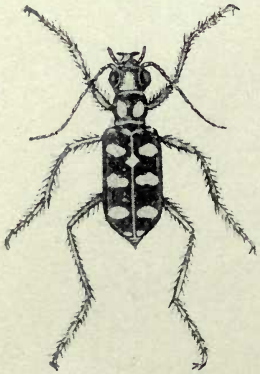


The large black carnivorous Beetle with the six white spots is common throughout the country and feeds probably on a variety of insect food, not despising young locusts when this pernicious pest is out on its great forays through the country.

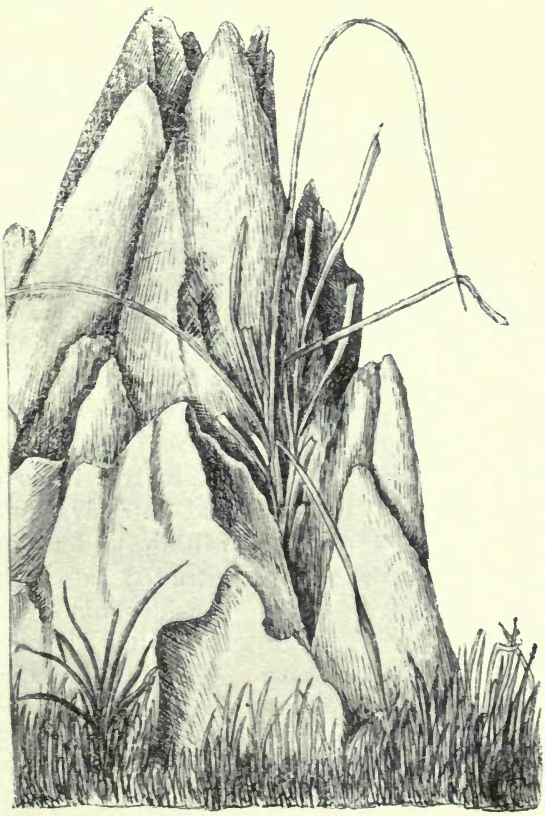
The other one is one of the Tiger Beetles, those brilliantly metallic coloured little insects which are often met running rapidly along the forest rides or flying in short swift flights in front of one. Difficult to catch are they, and probably amongst the most actively carnivorous of all insects, their brilliant metallic colouring and rapid active movements doubtless greatly aiding them in their continual predatory forays on their insect relatives.

It is perhaps almost superfluous to mention here that curse of the tropics the termite or 'White Ant.'

No true ant is he, though having the appearance of one and possessing many



of the habits and customs of the true ant. As we all know the termite, or I had better say some termites, for there are many species and they live in various ways, construct those large earthen mounds which we see so commonly when on our jungle forays in the forests throughout the country. Wonderful erections are these and they extend in ramifying tunnels and chambers as deep into the earth or to a greater depth than the portion



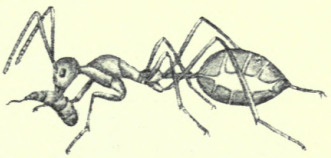
of the habitation reared above the surface.

Of all the numerous jungle pests which appear to have been created specially to annoy the shikar-loving Anglo-Indian commend me to the Red Ant and the Big Bee for two of the worst.

The Red Ant we have always with us in camp anywhere below the higher altitudes to be found on the great Himalayan chain and a few other mountain ridges scattered about the country. Under canvas as in the *howdah* or in the *machan* or at the *al fresco* lunch under a shady tree he is a particularly irritating and intrusive customer. Rarely is he willing to let you alone if you have intruded into what he is pleased to consider his domain, and the area of this latter is somewhat comprehensive!

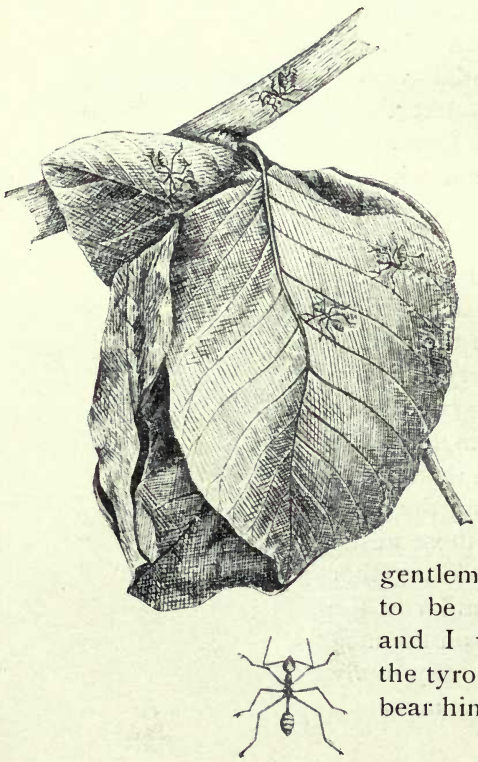
And when he means business, as we have all found out, it is time for us to leave and that in a manner more hurried than dignified!

As is well known, this notorious and vicious ant inhabits trees and makes a nest of leaves which it fastens together in a most ingenious manner. The adult ant possesses no material with which to fix up the leaves, but the immature ant or larva (as E. E. Green of Ceylon has shown) has glands which secrete a sticky substance and the adult ants make use of the grub much as we use a gum bottle. Several ants hold the leaves together whilst others, each seizing a grub and holding it between their mandibles as depicted in the enlarged figure here, use it as a kind of animated gum bottle to wet with its sticky material the edges of the leaves, which are then pressed together by the ants holding them.



It is in this manner that those nests, consisting of a mass of stuck together green and dead sál leaves (similar to the one shown on a reduced scale on the next page) which are to be seen so commonly in sál forest and elsewhere, are made. If

we examine them, they are seen to be humming with red ant life and woe betide the unlucky *shikari* who unwarily brushes against one when out on an elephant. Literally in a twinkling he will be covered with the brutes all intent on finding the softest portions of his anatomy to bite with as vicious a nip as they can possibly manage. Little short of a hurried strip will get rid of them then.



The red ant is pretty well an omnivorous feeder and will carry away any and every scrap of refuse you throw away during a tiffin in the jungle. He is a gentleman whose room is ever to be desired to his company, and I would strongly recommend the tyro in jungle matters to always bear him in mind.

Don't lay out lunch or sit down to it in his close neighbourhood.

Don't run into his nest when out on an elephant in the forest on *shikar* or any other intent.

Don't, when waiting for a beat, lean against a tree trunk without first carefully scrutinizing it to see whether or no there is a column or two of these vicious brutes retiring up into or descending from a nest in the branches. These are golden rules, each purchased by painful experience, which I would wish others to possess without paying for.

And yet even this ant has its uses, curious as it may seem. In Kanara and some other parts of India and throughout Burma and Siam a paste is made of him which is eaten as a condiment with curry! Surely after this there should be no more famines in India!!

Have you ever noticed lines of Black Ants solemnly walking up the stem of a tree or plant whilst others are



descending—all apparently equally in a great hurry?

You may have noticed such, and curiosity may have stimulated you to carry your investigations further to endeavour to find out where these ants were going and what they were going for. At the top of the plant or shrub stem, for in the case of a big tree your curiosity would have perforce to take a rest unless you happen to be a climbing enthusiast, you may have found flowers and fruits or leaves and buds only, but you may have noticed that the stem or leaves or fruits were wet and sticky and that clustered round them or on them were tiny green, brown or black insects. These are our friends the Blights or Aphis again with which we made acquaintance in the garden.

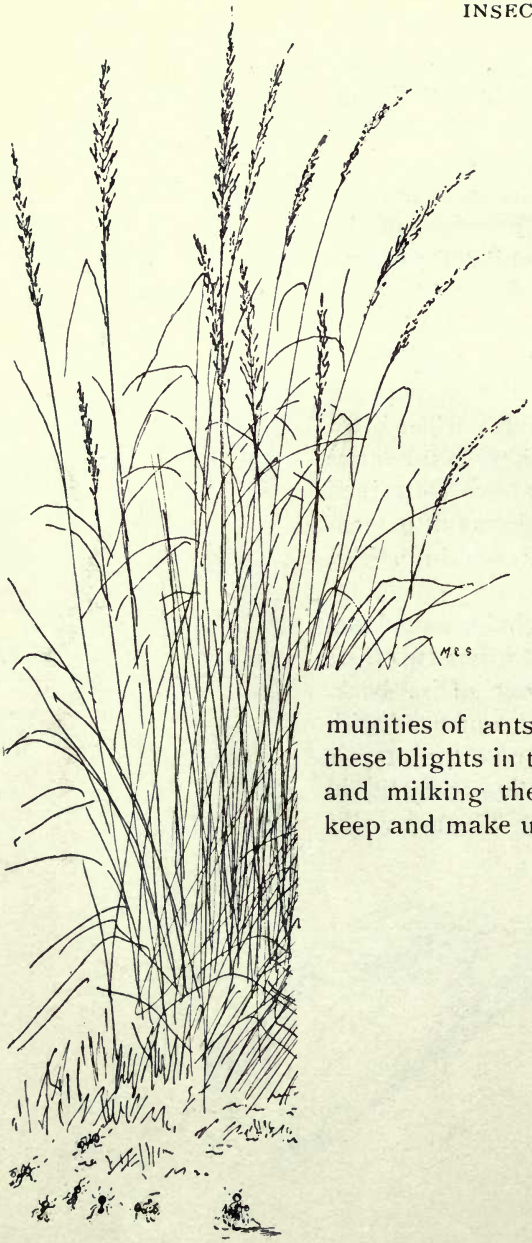
These little insects as we have seen feed on the sweet sugary sap of the tree drawing it in through the proboscis-like

mouth and exuding it or passing it out at the other end of the body. They spend their lives doing this and are little more than animated siphons.

Now ants, as we all know, are extremely fond of sugar, and those members of the community who are not addicted to occupying with us our homes and helping themselves from our sugar basins or dessert dishes, but live out in the jungles as all decent insects should have perforce to search for this commodity elsewhere. And the blights provide it in abundance not only in the manner above described by exuding sugary excretions on to stem and leaf of the plant they are infesting, but also in another way.

If you examine the blight here depicted enlarged you will see that it has two little processes sticking up out of its back. These are two little tubes connected with the interior of the body, and if the latter is pressed from outside a little sugary liquid exudes from these tubes. The ant walks





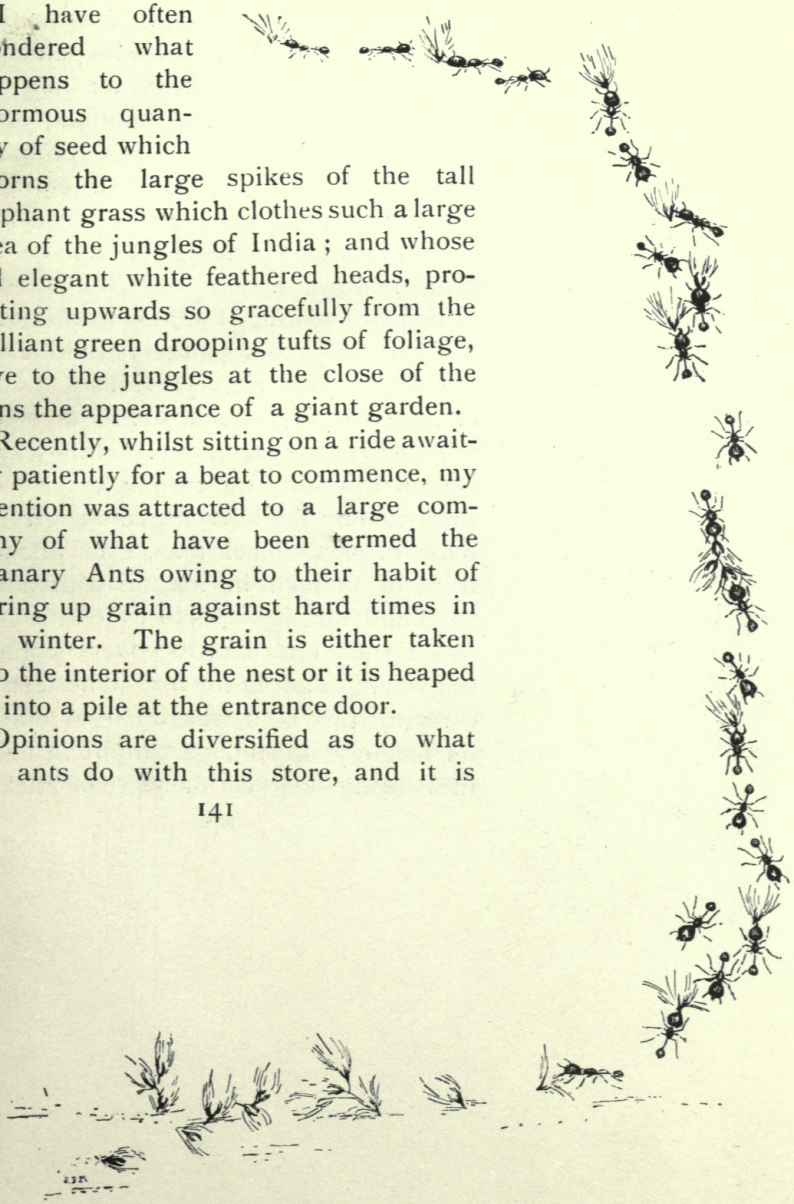
up to an aphis from behind and with his feelers drums on the back of the insect, thus causing some sugary liquid to rise up and overflow from the little tubes. This he then proceeds to suck up and repeats the operation until he is either satisfied or the aphis runs dry for the moment, when he seeks out another.

The process you will perceive is very much like our own method of milking the cow. And indeed some communities of ants keep certain species of these blights in their nests, feeding them and milking them after the manner we keep and make use of cows and goats.

I have often wondered what happens to the enormous quantity of seed which adorns the large spikes of the tall elephant grass which clothes such a large area of the jungles of India; and whose tall elegant white feathered heads, projecting upwards so gracefully from the brilliant green drooping tufts of foliage, give to the jungles at the close of the rains the appearance of a giant garden.

Recently, whilst sitting on a ride awaiting patiently for a beat to commence, my attention was attracted to a large company of what have been termed the Granary Ants owing to their habit of storing up grain against hard times in the winter. The grain is either taken into the interior of the nest or it is heaped up into a pile at the entrance door.

Opinions are diversified as to what the ants do with this store, and it is



probable that the method of extracting food from the seeds varies with different species. Some probably feed on the saccharine matters contained in the seeds, whilst others, many of those probably who heap the grain at their entrance door, allow the mass to ferment and feed upon the sugary matters contained in the fermented grain.

Whilst awaiting the aforesaid beat I noticed that most of the individuals of the company of ants previously alluded to were carrying one of the seeds of the tall elephant grass apiece. Rarely have I seen anything so curious as the sight presented by the hurrying and scurrying mass of small black ants, each about a third of an inch in length, with a big head and strong jaws in which the seed was tightly clutched, its silvery feathery tuft waving aloft in the air. The task of carrying this seed was no light one as its feathery appendage caught in every little blade of grass or piece of stick or

other obstruction met with and then had to be hauled away by sheer force ; also two ants meeting would almost invariably brush the tufts against each other when they would cling together like wax, the deuce of a tug-of-war being the result.

During the half hour I watched these serious minded little chaps at their laborious task (Why is it there appear to be no slackers or unemployed amongst the worker ants? Have they reached a higher civilization than our own ?) I calculated roughly that I had seen the entire crop of seed of several of the giant grass heads pass before my eyes in the tightly closed grip of these industrious little creatures. A goodly store they must lay up at this rate, but then they have four months of a severe winter to pass through in these northern parts of India.

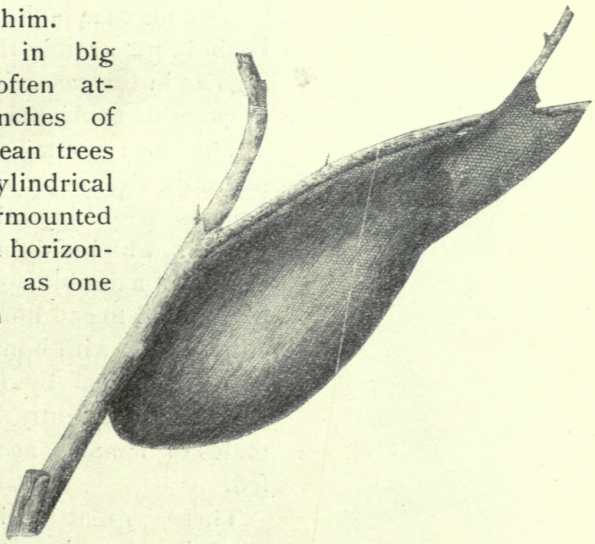
Some days later I happened to observe a couple of double rows of this same ant streaming across an open space near

the rest-house. On following the black stream for a short distance I came upon a small bare broken patch of earth with several small openings and cracks in it, the total width of the broken area being about four inches. Down these openings and cracks my little friends, carrying the grass seeds brought from a considerable distance, for the nearest grass jungle was a good hundred yards off, were disappearing in a continuous stream whilst fresh relays of workers were issuing and hurrying back along that black stream.

With a pointed stick I carefully dug down on one side of this nest and found that the openings outside led to a system of ramifying tunnels, some leading to oval chambers only about an inch below the surface whilst others went down much deeper into larger chambers. Some of the smaller ones near the upper surface I found filled with a store of seed whilst other seed had been taken down

below into the chambers in the interior where the real nest was apparently situated.

I alluded to the Big Indian Bee above. Few shikaris amongst us have not at one time or the other had a far too intimate acquaintance with this insect to be likely to ever forget him.



This bee lives in big nests which are often attached to the branches of large trees, I mean trees possessing a tall cylindrical columnar stem surmounted by a few main stout horizontal branches such as one sees in the common cotton tree (*Bombax*). These are favourite building sites for the big bee and to the under side of the horizontal branches

the semi-elliptical combs of as much as 5 feet in length and 2½ feet in width are affixed. Attimes, however, and especially is this often the case in Northern Indian jungles, you will find the nest attached to a low bough in a dense thorny thicket. Or the bees build in rocks and cliffs as in the famous case of the Marble Rocks near Jubbulpore, or affix the combs to buildings as in the case of the Taj at Agra, or in caves as at Ajanta off Bombay.

The nest contains three forms—the males or drones who do no work, the females who lay the eggs and the workers, who build the giant nests consisting of a double row of hexagonal cells placed end to end horizontally, which are either filled with honey or wax or pollen or are tenanted by the grubs or pupæ which subsequently become workers or males or females according as they are fed.

These great colonies are permanent, *i.e.*, they do not die out at the close

of the season, the formation of a new colony taking place by 'swarming.' This swarming of bees is not a nuptial flight as is so usually supposed. The swarm consists of one female and a number of workers. It is these swarms which at times make their appearance in our gardens and take up a position in some large tree or, worse still, endeavour to construct their nest in the eaves of the house. On no account should the latter proceeding be tolerated as they make the place uninhabitable.

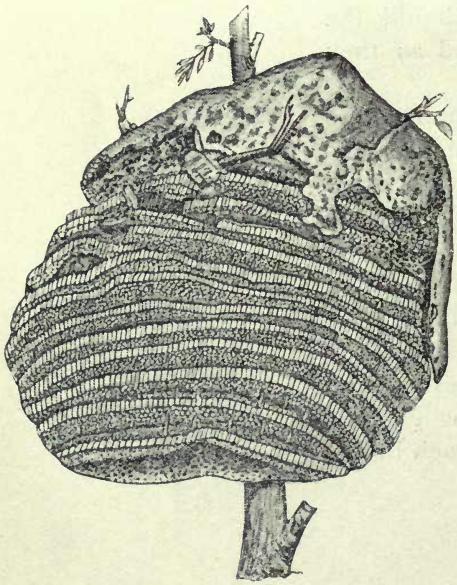
They should be smoked out at once and *before* they have established themselves.

The nest of the big bee is quite different in appearance and shape from that of the common large Indian Hornet, an insect which also requires respectful attention from man owing to its nasty sting.



You will remember to have seen large whitish cardboard-like masses several feet in length, looking like gigantic eggs placed high up out of reach in the

branches of trees. These are the nests of a big hornet and they are inhabited by a large number of individuals. In the figure showing one of these nests the outer envelope, which consists of a kind of papier maché made of chewed materials by the wasp, is partially removed. Beneath the combs are exposed. These combs are horizontal, not vertical as in bees, the cells thus being vertical. The combs are arranged in layers like the stories of a house, each story being supported by little columns as can be seen in the figure.



Wonderfully orderly is this beautifully constructed home of the hornet, but if occupied it requires to be approached with care or, better still, be given a wide berth! But to return to our bee.

The Big Bee can be recognized by its size and elongate body. Its sting is very poisonous, being most deadly in the hot weather; and when the blood is in bad condition is not unlikely to cause the death of Europeans if badly stung. That this is not the case with the jungle tribes of the country appears certain, as the writer has seen Kols and Santals with many stings in their bodies, but apparently suffering no inconvenience therefrom.

This bee is very difficult to dislodge, as it will return again and again to a chosen site, thereby greatly injuring buildings. Arches in the beautiful Taj Mahal at Agra were at one time greatly disfigured by the combs of this insect.



The following interesting note by Major T. R. A. G. Montgomery on the nuisance and damage committed by this bee at the Ajanta Caves appeared in the *Pioneer* some time ago :—

"The Collector of Khandeish has written to warn visitors to Ajanta of the

danger caused by bees. These industrious and vindictive insects appear to be as dangerous now as they were in 1877 when Mr. Burgess, the Archæologist, "was dreadfully stung and had to remain in the river for hours up to his chin in water." So important was the matter formerly considered that in the 1879 edition of Murray's Handbook, travellers to India are recommended to supply themselves, as part of their outfit, with "a pair of *stout leather gauntlets* coming up above the wrist half-way to the elbow, and a *light wire-mask with a back-piece* to protect the back of the head and neck," for use when visiting the caves of Ellora and Ajanta as a protection against the bees, "many persons having been so badly stung that in some cases death has ensued." In the same guide-book we read as follows :—"Having located himself, the traveller will do well to send for Imam, the great bee-hunter of Ajanta, and enquire in what state the

bees are. If likely to be troublesome, Imam will arrange for their destruction before the caves are visited."

"Apart, however, from the danger to those visiting what Murray describes as "the most extraordinary sight that India has to show," there is another fact I would like to bring forward, namely, that the bees are one of the chief causes of damage to the famous wall paintings in the caves. In Messrs. Ferguson and Burgess's book on the Cave Temples of India it is stated that "forty years ago (*i.e.*, about 1839) the paintings at Ajanta were very tolerably complete and their colours exhibited a freshness which was wonderful, considering their exposure to the vicissitudes of an Indian climate for from 15 to 18 centuries. Since that time, however, bees, bats and barbarians have done a great deal to obliterate what was then so nearly perfect."

"As the State protection of the remains of ancient India is now about to pass into

law, might I suggest to the authorities that a small portion of the money that will soon be annually allotted for the purpose of preservation be devoted to the eviction of the bees of the Ajanta caves? This would simply mean a trifling amount spent in wages to Imam, the bee-hunter, if he is still alive and active or to his successors if he is dead. It is not every day or in every country that one can see paintings seventeen hundred years old, and it will be indeed a pity if the present opportunity be not taken for establishing the periodical ejection of the bees and bats of Ajanta, on the two-fold grounds of preserving the paintings and ensuring the safety of sight-seers; while as for the 'barbarians' they will soon have become creatures of the past."

The Anglo-Indian shikari might, by the way, think over the tip of the *iron mask* and *leather gauntlets!!*

The big bee appears to be common all over the country and goes up to over

7,000 feet in the Himalaya. When disturbed, it will attack both man and beast with the utmost fierceness.

Many are the stories extant in this connection and some of them exceedingly ludicrous Two men were resting between beats one hot May morning in a Central India jungle. One of them unwarily lit a pipe. Overhead spread the crown of a tall cotton tree with a dozen great combs of the big bee attached to its branches. In the hot weather he is particularly vicious and vindictive, and resenting this intrusion he was down on that twain in a twinkling.

It was an utter rout and the elder of the two, a respected bald-headed Colonel of H. M.'s British Regiment of Foot, led the retreat, which had no strategy about it. They 'did time' towards the open country a mile and a half distant and every now and then the Colonel would take off his *topi*, which unfortunately had a ventilating space round the inside as the bees soon dis-

covered, and frantically beat his bald pate which the insects had found out as a particularly suitable spot for attention! When the bees finally left them, the Colonel had to all appearances suddenly grown a stiff crop of bristles all over his poll and it took a lot of attention, profane language and ointment to get rid of all those bee stings.

The healthiness of those two men and the nearness of the open country saved them from worse consequences than a few days' absolute disfigurement, a lucky escape which was not accorded to a young half-grown tiger which had been captured one day in a tiger drive and was being carried up in a cage by coolies to a head-quarters station in the Hills. Suddenly the bees descended, the coolies bolted, and that wretched tiger was stung to death on the road.



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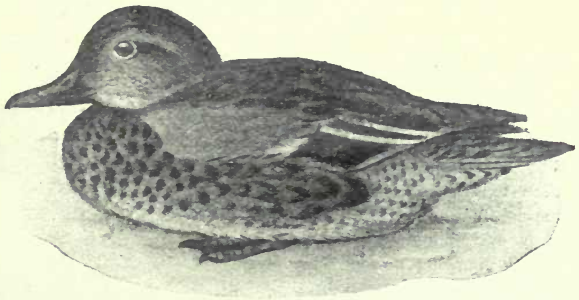
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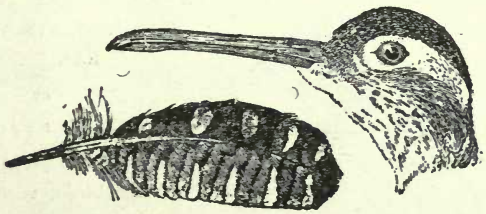
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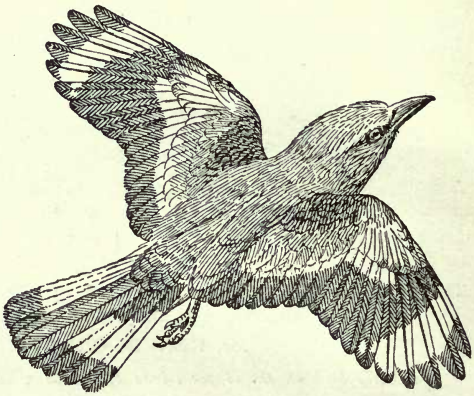
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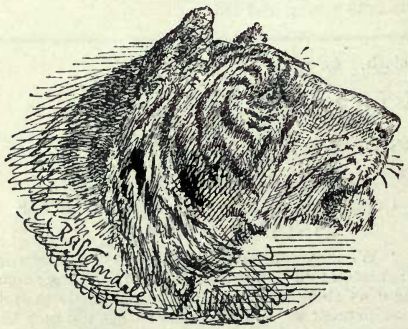


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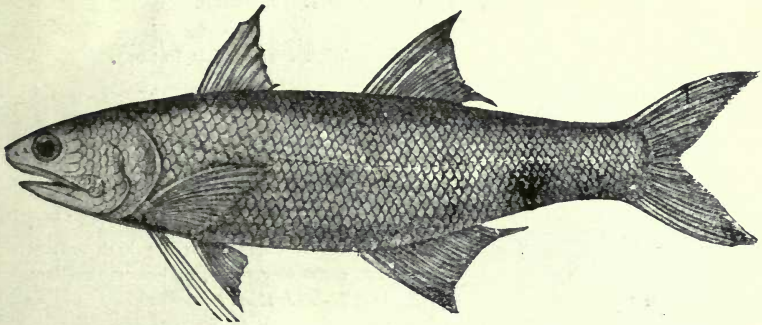
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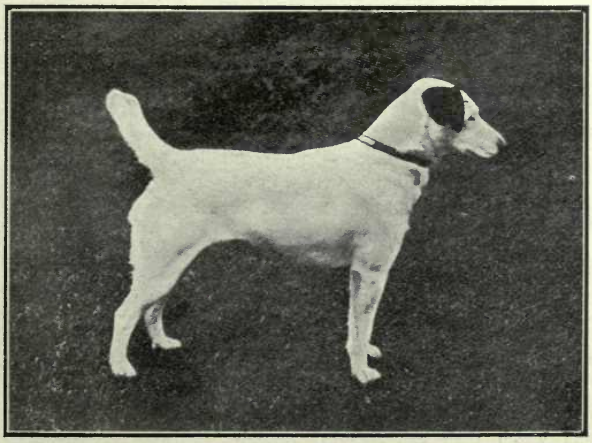
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